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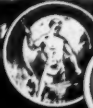
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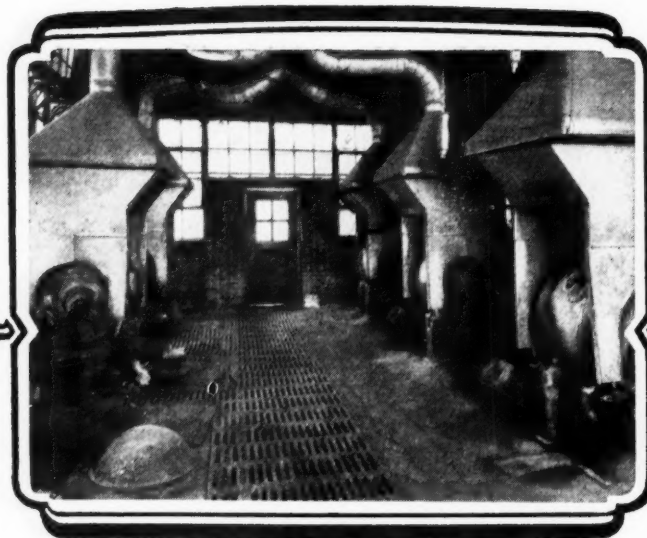
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AUTOMOTIVE INDUSTRIES

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NUMBER 14

Scrapping of Old Cars a Problem Which Calls for Study

When should a used vehicle be junked, and shall the dealer or the manufacturer be made responsible for the process? Whether to salvage and resell parts is a vital question.

By John C. Gourlie

THE hammer of the wrecker is echoing today wherever motor cars are being produced, sold or traded. More scrapping of old cars is being done than ever before and there is every indication that the proportion of cars removed yearly from the registration lists by this means will continue to increase. More than two million vehicles were scrapped last year without any of the aids to profitable scrapping that are now making their appearances.

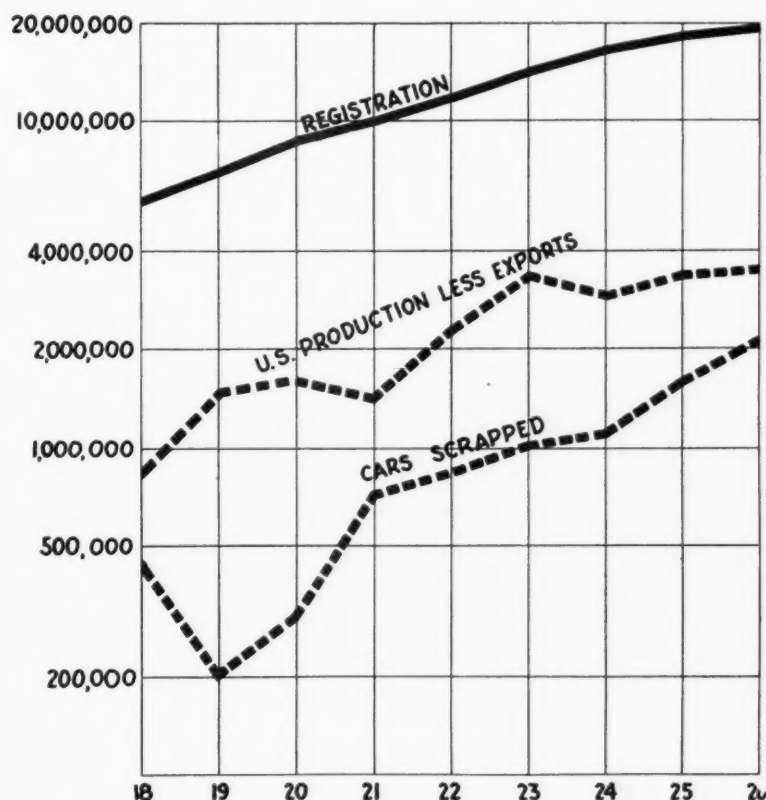
This tendency has elevated the problems surrounding the destruction of old used cars to major standing, if they are not already the most important ones that the industry and trade have to consider today. Probably no others affect so many of the factors in the production and distribution of automotive products.

It is probable, though proof of the point is hard to establish, that cars are currently being scrapped at an earlier period of their supposed life than was the case two or three years

ago. The accompanying chart is not decisive, but it does indicate something of the sort. The mere fact that the curve showing cars scrapped has taken in the last two years a much sharper upward trend than that showing production for domestic consumption is not necessarily significant, but it is of more than ordinary interest that cars scrapped last year were more

than the total annual domestic consumption of new cars in any year previous to 1922.

Apparently more cars less than five years old are being scrapped than the industry's statisticians have forecast. Perhaps the sole reason is the heavy depreciation in open used car values, which has almost certainly accelerated the movement toward the junk pile. But the style appeal in new cars and the increasing difficulty of selling old and obsolete models whether closed or open are more permanent influences and even without them it is plain that the time is not far distant when the curve of scrapping will approach



This graph shows the increase in the number of cars scrapped in recent years in relation to production for domestic use and registration

very closely the line of annual absorption of new cars.

The problem of scrapping, therefore, becomes one of determining upon the most effective means of handling a condition that is approaching the peak of its importance.

Dealer Primarily Affected

The dealer is, of course, the most immediately affected by scrapping. But the car manufacturer and the independent parts maker are no less concerned, and all are involved in a different manner if scrapping is to be entire, involving the destruction of the parts as well as the whole, or if certain parts are to be salvaged for service work. About this question revolves

A GROUP of dealers in Jacksonville, Fla., have formulated plans for a cooperative organization, regularly incorporated, for the express purpose of junking cars, the participants subscribing to blocks of stock. It is proposed to buy cars for scrapping from anyone.

The plans, if it proves workable in the long run, will assure dealers that cars sold for scrap do not come back into circulation again, and it will provide for an economical interchange of special parts. This is one of several interesting developments discussed in detail in the accompanying article.

one of the most earnest debates of the year. Some of the effects of the whole scrapping problem to be considered are:

1. On the sale of new cars.
2. On the servicing of old ones.
3. On trade allowances.
4. On the parts makers, and the factory service departments.
5. On the dealers' inventory of used cars.
6. On the factories' claims of long life for their products.
7. On the motor-owning public.

The typical operations of a typical dealer in, for instance, the low-priced class, where cars at or near the end of their period of economical service are concerned, may be described as follows:

A prospect brings in what the trade calls a "klunk," a "crock," or anyone of half a dozen other disrespectful names. He expects \$50 allowance on it at the very least, and he is right, for allowances are seldom if ever under this figure. The dealer allows the trade and then begins to figure his next step. Will he spend \$50 needed to put the car into fairly good running order? He will not, because he knows he cannot get \$100 for it.

Hates to Face His Loss

Does he haul it around to the wrecker, get his \$10 or \$15 and take a quick loss? He does not, because he is not yet willing to admit he has made a particularly bad trade. He prices it at \$50 or \$60 and waits till someone brings in \$20 or \$25 as down payment on the job. The financial standing and general character of a buyer of this sort can well be imagined. He runs the car till it breaks down and then the dealer has a repossession on his hands.

Several of these disreputable vehicles accumulate

and the dealer at last decides that something drastic must be done. He tightens his belt and hauls the lot to the nearest wrecker. Is this the end? It is not. One of those wiseacres—and there are many of them—who knows how to gyp the dealer, pays perhaps \$25 for one of the "crops" and offers it in trade at \$75 or so on a better used car or a new car.

All of which may be somewhat exaggerated, as far as the better class of dealer is concerned, but it does represent roughly what is going on in a large number of instances. With this background, it is interesting to note the measures proposed by the dealers of Jacksonville, Fla., to meet the issue.

A group of these dealers have formulated plans for a cooperative organization, regularly incorporated, for the express purpose of junking cars, the participants subscribing to blocks of stock. The only plant needed, it was decided, was a building equipped with bins for storing salvaged parts. A tentative upper limit of allowance on any car to be wrecked was set at \$30, with the expectation that the average price would be considerably lower.

While these measures were being considered a Jacksonville junk dealer came forth with an offer to buy the proposed business and to raise the top price to \$40. If a private concern was so anxious to obtain the business and to raise the limit, they came to the conclusion that there must be profit in junking and went forth with more determination than ever.

It was proposed to buy cars for scrapping from anyone, whether a member of the group or not. Cheap labor would tear down the cars and special spraying equipment would make it an easy matter to clean up all the usable parts, which then were stored in the bins for sale. Members would be granted a discount from list prices established for outsiders.

Plan Has Many Advantages

The plan, if it proves workable in the long run, will assure dealers that cars sold for scrap do not come back into circulation again, and it will provide for an economical interchange of special parts. With a group working on a big scale, furthermore, the returns from scrapping ought to be greater and ultimately perhaps permit a higher allowance. There is, for instance, a market for the curled hair reclaimed from upholstery. An individual dealer or wrecker on a small scale could not salvage enough of this to make it worth selling or buying. Other possibilities will doubtless eventuate.

Individual dealers have found it profitable to do their own junking. They operate by turning their mechanics and other shop workers to do the work at dull periods for regular service. Dealers that have gone at the problem seriously have often been able to reclaim from the car more than it would have brought from the wreckers. But even so, they have been using more valuable space and the time of higher priced men than a regular junking organization would require. So there seems little reason to question the success of an efficiently managed cooperative movement.

Still another way of handling the scrapping of old cars is for the factory to give the dealer a fixed sum for every car destroyed without salvage of any of the parts. Whatever may be said about the abstract economics of such a plan, it will be pursued and copied if it can be shown to bring profit to the manufacturer and to benefit, or at least not to harm, the dealer. But it seems that whatever small measure of

increased parts sales may come to the factory through the complete destruction of cars with usable parts will not compensate for the expense of the process.

A factory in adopting such a plan, therefore, may have primarily in mind the removing of circulating old cars and the making way, somewhere or other, for another new car purchaser. Both these objects are attained by the Jacksonville plan if the dealers really support it, and do not attempt to sell any cars for operation that ought to be scrapped. This latter contingency apparently is one thing that the factory plan will guard against.

On the other hand, the factory plan on the face appears feasible only for the lower-priced cars. The allowance that would have to be made on cars selling above the \$1,000 price class is enough to make anyone pause. With a small allowance, the cost of which is spread over all new car sales, the injustice, if any, to the new car purchaser is very small, and whatever the future may hold it is certainly true of the past that the buying public has profited enormously at the expense of the retail end of the automobile industry. It is high time the burden was shifted, and the buyer eventually will have to pay in lower allowances on trade-ins if some other means is not taken to make him pay what the product is worth.

Protection for the Dealer

The factory plan, then, is to a large extent a protection to the dealer in his used car business. He will not junk any cars for which he can get more than the factory allowance, and there is consequently no reason to be too much concerned about the uneconomic aspect of the presumable destruction of unused transportation. The amount of economical transportation in a used car that cannot be sold for more than \$50 can hardly be very great. And the man who will buy a vehicle of this type is not going to spend any worth-while sum of money to keep it running.

If this is true, and there seems little reason to doubt that it is, it might appear that few prospects for better used cars or for new cars will be created by the junking of old jobs under factory financial encouragement. A \$50 used car prospect is just about that and nothing more. There is probably something, however, in the argument that elimination of the decrepit old junks from the road would reduce congestion, speed up traffic and make motoring safer and more pleasant. Somewhere, then, a prospect might be created when a car is scrapped.

The question of salvaging parts from junked cars is another pregnant issue in the general subject of scrapping. Although in the factory plan the possibility of reclaiming parts is obviated, this can hardly be regarded as an essential feature, for the reason already mentioned—that sales of factory parts arising from the destruction of parts in a scrapped car could not compensate for the expense to the factory involved in the plan.

As a matter of fact, the sort of parts customarily reclaimed from junked cars are not the fast-moving ones that mean most to factory service departments, to independent parts manufacturers and to parts jobbers. The parts that wear out fastest are just the ones that are usually impossible to salvage, unless the dealer or repairman is willing to cheat on a job and in that event little is to be hoped from him anyway.

Wreckers say that the items usually reclaimed include wheels, cylinder blocks, rear axle housings,

front axles, connecting rods, electrical equipment, occasionally accessories such as shock absorbers, and sometimes crankshafts. The internal parts of an engine are hardly ever salvaged because they are worn and inaccessible.

So far as replacement parts manufacturers are concerned, therefore, the prospective developments along these lines do not involve any substantial amount of business. Besides, such manufacturers are in nearly all important instances also suppliers of original equipment, and anything that benefits, however indirectly, the new car end of the business will benefit them.

There is a possibility that as more cars are junked,

WHEN and how to scrap old used cars, "crocks" as the dealers call them, is not a new problem, but it is one which is just beginning to be seriously felt in the industry. And the older the industry grows the more pressing the problem will become.

Today there are thousands of old cars on the road and in dealers' hands which might better be in a junk yard. They are bad money in the sound currency of the automobile trade. On the basis of present knowledge, it would appear a beneficial development if they were taken out of circulation.

and as more of the big expensive units become available through cooperative or private plants for salvaging parts, the price of the materials in big repair jobs will be brought down to an extent that reconditioning of old cars may be encouraged. One important factory with this end in view is buying up cylinder blocks from junked cars, reboring them and fitting them with oversized pistons, and selling the reconditioned block at a large saving as compared with the price of a new one.

Only Experience Can Tell

Whether reconditioning as a result of lower cost of parts will be increased must be left to experience to determine. Whether it is a good thing to foster depends on the conscience of the factory. Certainly longevity of cars has been a good sales argument in the past. With the growth of the trading habit the original owner of a car seldom gets all the mileage out of it, but if it is built for endurance he will profit by a higher trade-in allowance.

Doubtless the automotive industry and the country as a whole would be better off in the long run if everyone avoided waste and got all the value out of a product. But so long as human nature remains as it is, an industry is likely to suffer in competition if it refuses to go after the unthrifty dollar. Practical considerations of profit ought to rule.

The subject of scrapping deserves more study than it has received. Its complexity is one of the aspects of its intrinsic importance. On the basis of present knowledge, it would appear a beneficial development if more of the nearly valueless cars were taken out of circulation. They are bad money in the sound currency of the automobile trade. But if the dealers rather than the factories can handle the job, everyone concerned ought to be better off.

Greater Silence of Internal Gears Accounts for Renewed Interest in 4-Speed Transmissions

Development now taking place based on discovery that internal gears of comparatively small ratio can be made to run more silently than corresponding spur gears.

By P. M. Heldt

A YEAR or so ago it looked as though the three-speed transmission would come into universal use on passenger cars. The four-speed transmission, which had been much used on the more expensive cars in earlier years, had lost ground and was continued only on a few models of small production which had not undergone any revision of their mechanical design for many years.

Since that time, however, development work has been under way on a new type of four-speed transmission by several concerns; three such transmissions have been announced already, and at least two more are under way. The question naturally arises as to why some manufacturers should find it desirable to return to the four-speed gear, which was discarded years ago, when they felt their engines had attained such a degree of flexibility that four changes of gear were no longer required; especially in view of the fact that engines have been improved with respect to flexibility right along.

It is the object of the present article to throw some light on this question. In addition, the differences between the new type of four-speed transmission and that previously used on passenger cars in this country will be discussed.

A Drastic Remedy

Practically every engineering practice is a compromise, minor difficulties or disadvantages being borne up with in order to secure certain definite results. But if design changes are continued in one direction, in order to achieve more fully the advantages chiefly sought, the accompanying difficulties may finally pass out of the "minor" stage and call for a drastic remedy. This is exactly what has happened in the automobile field.

American motorists want their cars to have exceptional "performance"; in other words, they want them to be capable of great acceleration. They also want them to be able to make almost everything on high gear, to obviate the inconvenience of frequent gear shifting.

To meet these demands, manufacturers have increased their engine speeds and at the same time increased the rear axle ratios. In this way they found it possible to increase both the acceleration on high and the limiting grade which can be climbed on high gear, without materially increasing the engine weight. But the proverbial fly in the ointment has not been missing; in fact, there have been two in this case.

In the first place, if a car is capable of ascending a 10-12 per cent grade on high gear, its engine will carry only a small fraction of its full torque load on the level at moderate speeds, and if the throttle is opened wide, it will run up to very high speeds, which are generally accompanied by noise and vibration. This makes the car unpleasant to drive at high speeds, and the wear and tear on the engine at such speeds will be relatively great.

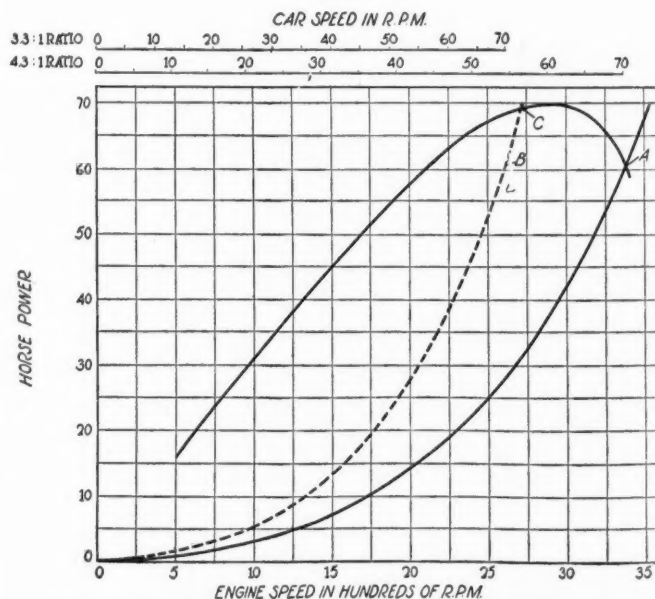


Fig. 1. Engine horsepower curve and curves of power required for car propulsion at different speeds

Secondly, the greater the rear axle ratio, the higher will be the fuel consumption. Thus, both "sweetness" of operation and fuel economy will be sacrificed. Furthermore, if a very large rear axle reduction is used and the throttle is fully opened while driving on a level road, the engine will run at a speed beyond its peaking speed, which means that the maximum car speed is less than it would be if the axle reduction were somewhat smaller. These relations can be more readily explained by reference to the accompanying diagram (Fig. 1).

Horsepower and Speed

In this the curve concave toward the base line represents the horsepower of the engine at different speeds under full throttle, while the full line curve convex toward the base line represents the horsepower required to propel the car at different road speeds with the usual rear axle ratio (assumed to be 4.3 in this case). Since the two curves intersect at a point which corresponds to 70 m.p.h., this is the maximum speed of which the car is capable, and it corresponds to an engine speed of nearly 3400 r.p.m. This, it will be seen, is considerably beyond the peaking speed of the engine.

The vertical distances from the "horsepower required" curve to the engine horsepower curve represent reserve power of the engine. For instance, at 35 m.p.h., only about 10 hp. is required, while the engine, at the speed it is turning is capable of about 50 hp., thus leaving a reserve of 40 hp. for hills or acceleration.

If the rear axle ratio be now changed from 4.3 to 3.3, we obtain the "horsepower required" curve shown by the dotted line. The "miles per hour" scale must be changed correspondingly, for the car will now run at a higher speed (about 30 per cent higher) for any given engine speed.

As a result of the change in the gear ratio, for any given car speed the engine torque will be 30 per cent greater. The horsepower consumed in driving the car will be exactly the same, but the engine is more efficient when developing the higher torque. Roughly speaking, at normal engine speeds, the fuel consumption of an automobile engine is about 0.6 lb. per horsepower-hour at full torque load and twice that at one-quarter torque load. There is, therefore, no doubt that with the smaller rear axle ratio, and the consequent greater engine torque load, the fuel consumption will be reduced.

Greater Maximum Speed

The maximum speed attainable will be slightly greater with the smaller rear axle ratio. On the "horsepower required" curve for the larger rear axle ratio the point of maximum speed attainable is indicated by A. On the other, dotted "horsepower required" curve, point B represents the same speed, and it will be seen that at this car speed there is still a considerable reserve of engine power. The maximum speed point on this curve is denoted by C, and is about 3 m.p.h. more than the maximum speed attainable with the larger rear axle reduction.

In this connection it is worth pointing out that the maximum possible speed is obtained with the rear axle reduction which will give a "horsepower required" curve that intersects the engine horsepower curve at its very peak. This is obvious, because, with the same car, the greater the horsepower expended in driving it, the higher will be the speed attained.

Many people are of the opinion that if the rear axle ratio is reduced so as to increase the torque load on the engine by 30 per cent or so, it will be necessary to do much of the driving on the "next-to-the-highest" gear,

but the diagram shows that this is not so. In fact, up to speeds of 35 m.p.h. the engine power reserve is almost as large with the smaller as with the larger rear axle ratio.

The main advantage gained by decreasing the rear axle ratio is that the average engine speed is much lower, in consequence of which the operation is much smoother, and wear and tear of the engine is reduced. This gain cannot very well be expressed in figures, but it can be very effectively demonstrated.

It is directly obvious that if the rear axle reduction is made smaller, more of the driving will have to be done on the "next-to-the-highest" gear, as the engine power reserve will be reduced. Now, it is possible to make the conventional gear box so it operates practically as silently on the lower gears as on direct drive, but in order to accomplish this it must be made quite large,

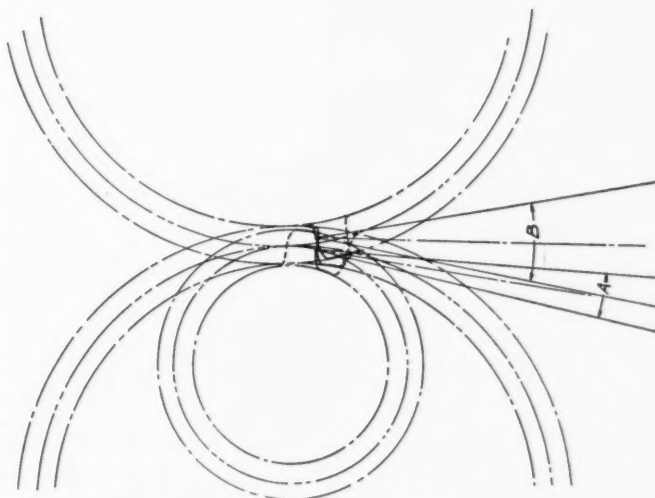


Fig. 2. Diagram illustrating relative sliding motion in spur (B) and internal (A) gears

with comparatively large tooth areas and a consequently more effective oil cushion; and tooth spacing and profiles must be of the highest degree of accuracy. Under American conditions of high-priced labor and severe price competition, this solution of the problem seems to be out of the question.

Recourse was therefore had to the internal gear, which is both more efficient and more quiet than the spur type of gear. The reason for the greater efficiency of internal as compared with spur gears can be readily explained. Power losses in gearing are due almost entirely to sliding motion, the more so the higher the degree of accuracy of tooth spacing and profile. There is no loss when one perfectly elastic solid rolls over another, and hardened steel has a high degree of elasticity.

In any form of gearing, when there is tooth contact at the pitch point, the motion is entirely a rolling motion, because the two tooth elements then in contact both move in the same direction. However, the teeth remain in contact with each other throughout a considerable arc of motion. At any point away from the pitch point the relative sliding motion is measured by the deviation between the tangents to the two pitch circles, and this, of course, is much greater with spur gears than with internal gears, for corresponding points, as clearly shown in Fig. 2.

The whole development dealt with in this article seems to be based on the discovery that internal gears of a comparatively small ratio can be made to operate

more silently than corresponding spur gears, at least if only the ordinary production methods are to be employed. The reasons for this more silent operation probably are that the tooth action is on the inside of the internal gear and any noise produced, therefore, is muffled by the gear web and rim, and that tooth contact takes place within an oil bath and extends over a somewhat greater arc of the circumference, which, in connection with the fact that somewhat wider tooth faces are likely to be used in view of the proportionately greater use of the gears for the transmission of the engine power, insures a very effective oil cushion. It has been found, moreover, that these internal gears can be assembled with practically no backlash, which obviates any noise due to the breaking of tooth contact when driving on rough roads.

The Displacement Factor

At the present time most passenger cars are so geared that the piston displacement per ton-foot of the fully loaded car is about 33 cu. in. on high gear, counting displacement under gas pressure only. This displacement factor is obtained by means of the formula

$$F = \frac{3,825 \, r \, D}{W \, d}$$

where r is the rear axle reduction; D , the piston displacement of the engine; W , the weight of the car with load, and d , the wheel diameter in inches. The average displacement factor for the intermediate gear is 59 cu. in. and for the low gear, 106 cu. in. As regards the piston displacement for the low gear, it varies between 85 for the lowest powered cars and 125 for the highest powered. The explanation as to why the smaller, low-priced cars can get along with a smaller displacement factor on low gear probably is that when it comes to the worst, the reserve power carried in the form of passenger load, as a rule, can be relied upon with a greater degree of assurance, and is also more effective.

With a four-speed gear designed to hold down the engine on "easy" roads, to save fuel and to reduce wear and tear, the displacement factor on high gear would be about 26 cu. in. per ton-foot, which is on a par with the displacement factor of light, low-powered European cars. Then, if the displacement in low gear is placed at 112 cu. in., which would seem to be sufficient for an average car, and the intermediate ratios are so chosen as to form approximately a geometrical series, the displacement factors for the four speeds would be

26 40 67 112

as compared with

33 59 106

for a conventional three-speed modern car. A comparison of these two series brings out certain advantages of the four-speed gear. The high gear is higher, which means greater economy, smoother operation and less engine wear and tear. The low gear is lower, giving a greater reserve for emergencies. With the four-speed gear the different gear speeds are closer together, which makes it unnecessary to operate the engine through such a wide speed range. Gear shifting is easier because of the smaller steps. The thermal efficiency of the engine is highest and the strains on it are lowest at moderate speeds, for which reason it is desirable to keep within a fairly narrow speed range. The ratio between the third and fourth has been purposely made slightly less than that between any other two gears, to facilitate shifting and to make driving on third more satisfactory.

Another method of imposing greater torque loads on the engine when driving on good, level road, or of keeping down engine speeds under such conditions, consists in the use of an over-drive four-speed gear. Such gears have been used in stock cars at various times in the past. In 1911, for instance, both the Winton and the Palmer & Singer carried them. As far as the effects on the engine are concerned, the same advantages are gained as with a normal four-speed gear and reduced rear axle reduction—provided the car is driven most of the time on the over-gear. An over-gear, however, involves the use of high pitch-line velocities, and it is difficult to get such a transmission to operate quietly. For this reason, the over-gear, where it has been used in stock cars in the past, has been used mainly to secure the slight increase in maximum speed which it makes possible. The car was driven on the over-gear only occasionally on the open road, when a little extra noise was not seriously objected to, most of the driving being done on the direct third.

The four-speed over-geared transmission may possibly play an important part in the replacement field. A change in the rear axle ratio might involve some difficulty, and in any case it would involve the expense of a new stem gear and crown gear. The cost of the change would be materially lessened if only the transmission had to be replaced, and with the over-geared transmission this would be all that would be required.

In the development of these new four-speed transmissions, established practices in transmission design must be departed from to a certain extent. The third gear no doubt will be used a good deal more than any of the lower gears of a three-speed transmission, and it must therefore show a longer life in the usual "accelerated" endurance test. That is, it must have gears of wider face width for the same load. This at the same time tends to insure more quiet operation. A fine pitch is necessary in the internal gears to make it possible to get the low reduction needed with gears of moderate size.

Intermediate Bearing Required

For quiet operation it is also necessary that the shafts be very rigidly supported. The span between the bearings in the wall of the case naturally will be a good deal longer, and an intermediate bearing is required, in addition to the bearing or bearings for the intermediate member of the double internal gear reduction. All of these bearings must be of adequate size so as to insure a continued rigid support.

As with a four-speed gear of this type changes from third to fourth speed and vice versa will be more frequent than any changes of gear in a car with three-speed transmission, it is essential that the gear be so designed that this change can be made very easily. This necessitates that the moment of inertia of all the parts rotating with the clutch when the device effecting the change-over from third to fourth is in neutral, should be very small. That is evidently the case if the double internal gear assembly is located ahead of the regular transmission. Change into first and second gear and reverse will be made somewhat more difficult, because the internal gears will rotate with the clutch.

This double internal assembly can be used also as an auxiliary change speed device and mounted either ahead or in the rear of a regular three-speed transmission, in which case a total of six forward speeds would be obtainable. But a separate lever probably would have to be used for such auxiliary transmissions, which complicates the control.



New Method of Machining Forged Hub Flanges Reduces Wear on Drills

*Production also increased by use of a special
five-spindle head and six-station indexing table.*

A SPECIAL five-spindle head and a six-station indexing table are used in one plant for the production of the taper holes in forged rear axle hub flanges. This equipment is fitted to the new Baker No. 50-H hydraulic feed type boring and drilling machine.

As compared to the former single-spindle set-up for the drilling operation, the new installation is noteworthy for a marked increase in production and the practical elimination of drill wear other than the natural wear at the cutting lips. Instead of changing drills after 30 or 40 operations, the drills run practically all day now. Handling has been reduced by the combination of the drilling and reaming operations in one chucking at one machine. The features of increased production and reduced drill wear are obtained to a large extent by breaking up the drilling operation into three successive steps. Also it is stated that the smoothness of the hydraulic feed contributes largely to both of these features.

As shown in the accompanying illustration, a pedestal which is bolted to the base of the machine carries the indexing table. The forged flanges are dropped into circular openings in the top of the table and clamped by means of a single handwheel which rotates with its shaft in a bracket at the front. As each station comes to the front of the machine, the handwheel shaft is engaged with a squared end on the individual clamping shaft on the

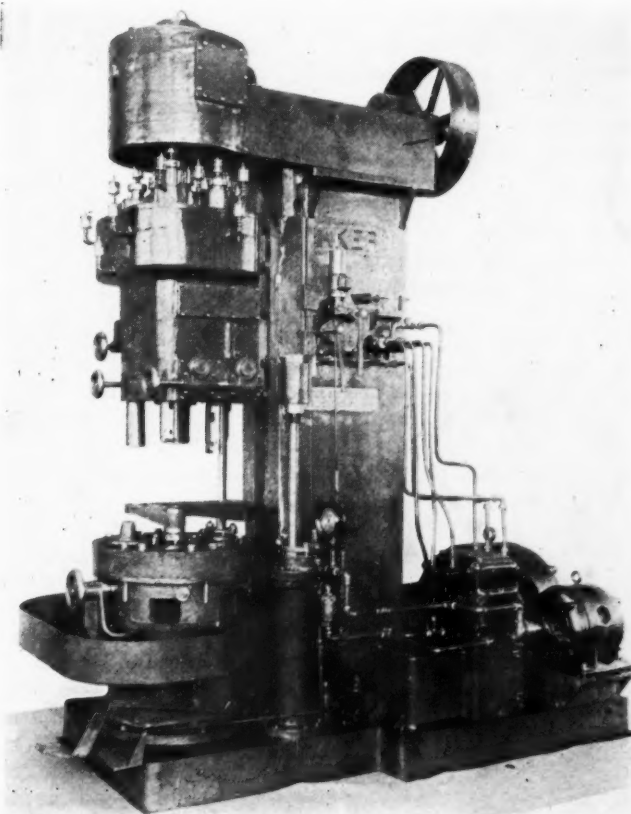
table. The index plug and table rotation are controlled by the treadle, as shown.

Following the loading operation, the table is indexed one station to the right, where a guide bushing, which is carried in a bracket extending out from the column, pilots the first drill. The five operating stations produce the following operations:

1. Drill the first third of the length of the hole.
2. Drill the second third of the hole.
3. Drill the hole through.
4. Rough taper ream.
5. Finish taper ream.

Due to the hydraulic feed provisions, the machine is semi-automatic and cyclic in operation. After indexing, the treadle at the right of the base is depressed, causing the head to descend rapidly until the work is approached. Then stops in the hydraulic control system reduce the vertical feed to the working rate. When full depth is reached, the stops cause the head to elevate rapidly to the topmost position and stop for the loading and indexing period and the repetition of the cycle.

Each spindle has separate vertical adjustment which compensates for wear and variation in the length of the tools; therefore the various spindles can be set for synchronized engagement with the work. As in most hydraulic feed layouts incorporating the Oilgear pump, an emergency control elevates the head to the top position if an obstruction is encountered.



Taper holes in forged hub flanges are drilled in three incremental steps and rough and finish taper-reamed in one set-up. The result has been a remarkable increase in tool life

Generator Announced for Lighting Vehicles Without Battery

New product of Robert Bosch Co. is of four-pole, cylindrical frame type with series armature winding, and voltage control is close over a wide range of speed.

SEVERAL new pieces of apparatus in the electrical line have been announced recently by the Robert Bosch Magneto Co., Inc., New York, N. Y. One of these is the Type K 50/6 generator for generating lighting current on trucks and other vehicles that carry no battery. Without battery the three-brush system of output control is impractical and some form of voltage control must be used.

One of the requirements in a generator for this service is that voltage control must be very close over a wide range of speed. The generator must develop sufficient voltage with the engine idling to enable it to light up the position lights, and the voltage must not rise sufficiently at the highest speeds of the engine to subject the lamp filaments to abnormal stresses.

The Type K 50/6 generator is of the four-pole, cylindrical frame type and has a series armature winding, which makes it possible to do with two commutator brushes, arranged at an angle of 90 deg. The brushes are located underneath the commutator, and the circuit breaker and voltage regulator are above it, compactly arranged and protected by a substantial housing. The ball bearings used in this generator are packed in a grease of special heat resisting qualities and require no lubrication.

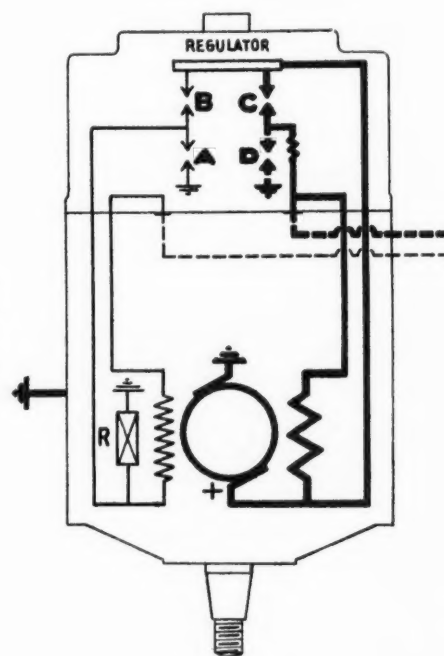
Wear on Regulator Contacts Reduced

A special feature of the control system is that when the lighting circuit is open the shunt field circuit also is open and the generator is "dead." This reduces the wear on the regulator contacts and increases their life. From a voltage diagram of the generator issued by the manufacturer it is seen that at 275-300 r.p.m. the voltage is sufficient to operate the position lights, while at 500 r.p.m. it approaches close to its maximum value.

A diagram of the electrical connections is shown herewith. The field poles carry a shunt winding and

in addition a small series winding. At low generator speeds both the shunt and series windings are active, the former because contacts *A* are closed and the latter because contacts *C* are open. As the speed increases the contacts *A* are opened, and the shunt field

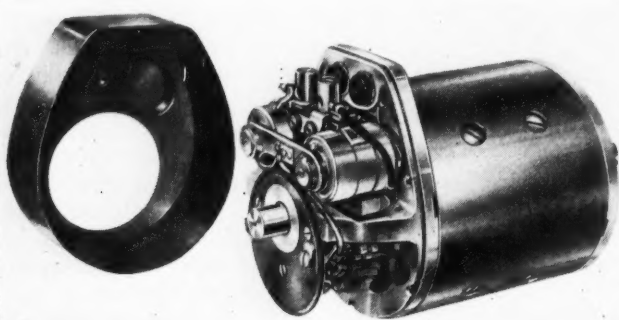
Diagram of connections of Bosch lighting generator for use without battery



current then is compelled to flow through the resistance coil *R* in series with the shunt field. This tends to reduce the field strength and thus to counterbalance the effect of the increase in armature speed. As the speed increases still further, a vibrator regulator carrying the contacts *B* begins to function, alternately opening and closing these contacts, so that the shunt field current is interrupted at short intervals. The higher the speed, the more rapid the rate of interruptions, and, owing to the inductance of the field circuit, the less the effective or average current through the field coils.

This generator is supplied for both cradle and flange mounting. It must be driven at crankshaft speed or faster and is then capable of carrying the usual lamp load on trucks and tractors, including such extras as spot lamps and interior lamps. For continuous service the load should not exceed 50 watts.

Several new types of magneto are also among the new Bosch products. These are the Type FF-4 and FF-6 for light cars, the FU-4 and FU-6 for standard



Robert Bosch Type K 50/6 voltage-control generator

truck, tractor and motorboat engines and the FR-4 for heavy duty service. With these types the company has adopted the unit cast frame type of construction. The frames, including both the base and two end plates, are in the form of a single aluminum alloy, permanent mold casting. The FF type is recommended for four-cylinder engines up to $3\frac{1}{2}$ in. bore and up to 65 lb. compression pressure; the Type FU for engines up to 5 in. bore and up to 80 lb. compression pressure, and the Type FR for engines of bores from 5 in. up and up to 95 lb. compression pressure. The FF and FU types are made in both four and six-cylinder models, while the FR type is made in a four-cylinder model only. The FF-4 model weighs only 8 and the FF-6 model 9 lb.

Electrically, these magnetos are very similar to former Robert Bosch models, but an improvement has been made in them whereby the effects of sooted spark plugs are neutralized up to a certain point. As a matter of fact, the voltage generated with the spark lever in the retarded position is higher for a given speed than in earlier models, so that any slight leakage due to fouled plugs interferes less with the operation of the system in starting the engine. The minimum speed at which the magneto gives an effective spark has been lowered.

The interrupter on this model is of a new design, its arm being made of aluminum alloy and very light. This renders operation at high engine speeds more reliable.

The Robert Bosch Magneto Co. has always strongly supported automobile contests and the winning cars in most of the so-called classical events in Europe in recent years have been equipped with its magnetos and

maintained, within a few per cent at least, an idea will be gained of the precision of workmanship required.

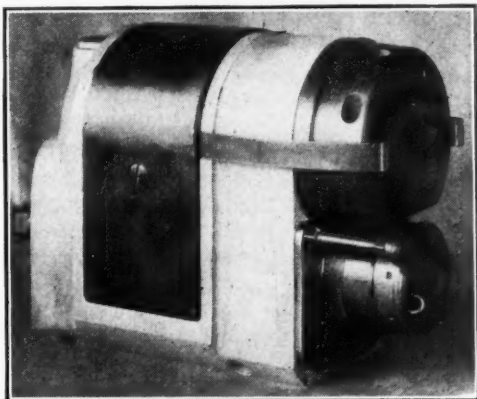
In order to make it possible to generate the large number of impulses required without excessive rotational speeds and excessive strains on the armature coils, a stationary armature is employed, together with a stationary field and a pair of revolving sectors in the so-called armature gap, whereby four impulses are produced per revolution. The Type FH-8 racing magneto herewith illustrated is designed to furnish reliable ignition for eight-cylinder racing cars up to speeds of 8000 r.p.m. The interrupter is of an entirely different type from that used on Bosch magnetos for stock engines, in that the interrupter arm does not revolve but is mounted on a stationary pivot.

Two Separate Interrupter Arms

There are, in fact, two separate interrupter arms, each of them interrupting the low tension circuit for every alternate spark. These interrupter arms are actuated by means of a four-lobed revolving cam mounted on the distributor shaft. The two interrupter arms bear such an angular relation to each other that any point in the cyclic operation of one of them is separated equally from corresponding points of two successive cycles of the other. It will be noticed that the distributor used with this magneto is of the so-called jump spark type, as distinguished from the brush type. In the illustration the distributor rotor is seen between the magneto proper and the distributor cover, and the distributor segments may be seen in the distributor head or cover, while in the lower chamber in the cover, in line with the armature, may be seen the condenser.

The Type FH magneto has found much favor with American racing drivers and we understand that practically all of the cars entered in races sanctioned by the A. A. A. are equipped with it. Most of these engines are Miller Specials, which run as high as 7500 r.p.m., and the magnetos have stood up well at these speeds.

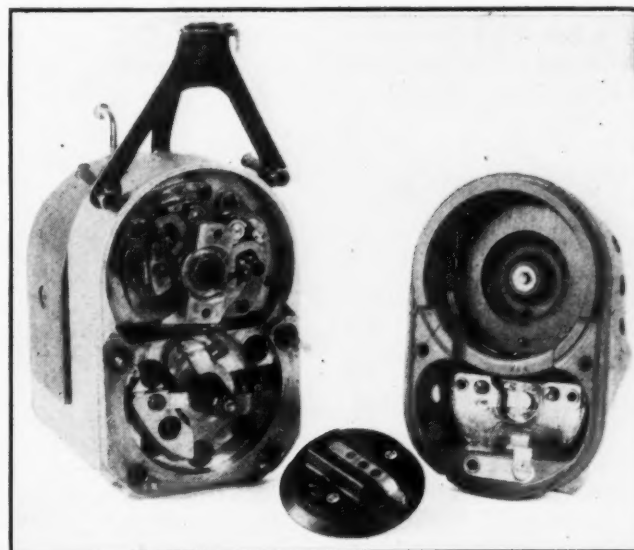
At the present time the Robert Bosch Co. is designing a racing magneto which will be guaranteed to function properly at speeds up to 10,000 r.p.m. It will give four sparks per revolution of the rotor sleeves and will probably have three breaker arms, together with a corresponding number of stationary interrupter contacts.



New Bosch Type FR-4 magneto

spark plugs. Demands on ignition equipment of racing cars have been more severe in recent years, due to the introduction of superchargers and the consequently increased compressions, and also to the use of much higher engine speeds.

Considerable interest was aroused in this country last summer by the announcement of an Italian racing engine designed for an operating speed of 11,000 r.p.m. It was this great increase in engine revolutions that led the Robert Bosch Co. to develop a new type of magneto—FH-8—that should be capable of both generating the greatly increased number of current impulses required and of accurately timing them. If we take, for instance, a six-cylinder, two-stroke engine turning at 11,000 r.p.m., the number of sparks required for its ignition is 66,000 per minute or 1100 per second. Hence the time interval between successive sparks is $1/1100$ second, and when it is considered that this time interval must be accurately



Robert Bosch Type FH-8 racing magneto

Research Gradually Overcoming Lacquer Color Weaknesses

Introduction of pyroxylin finishes accompanied by difficulty in development of pigments which were satisfactory from the standpoints of durability and luster. Opacity is important.

By A. F. Denham

ADoption during the past few years of pyroxylin lacquers as standard finish on a majority of cars brought with it new problems in color technique. The Ditzler Color Co., one of the leading exponents of color development in the country, has conducted extensive researches in the lacquer field and its findings and developments are of peculiar interest at the present time because of the wide demand for greater color variety and new colors on the part of the car manufacturers and the public.

Accompanying this article is a table giving the general relative characteristics of base color pigments as outlined by the Ditzler company. Unfortunately these characteristics hold true only when the colors are used separately and not in combination with others. Two pigments may each have good durability and luster when used alone; when used together they may make up into lacquers which are poor either in lustre or durability or both. Causes of such changes are nearly always indeterminate and proper combinations have to be worked out mainly by experiment. Since every color and shade represents a problem in itself, it is impossible to discuss here in detail the development of the hundreds of different lacquer "colors" on the market at present.

The inapplicability of knowledge regarding combinations of

pigments gained from the paint field is one of the chief causes bringing about the need for both fundamental and specialized research in the lacquer field.

According to the Ditzler Color Co., four general characteristics have to be considered in the development of each new shade of pyroxylin lacquer, the various characteristics, which are closely interrelated, being as follows:

1. Resistance to actinic rays (durability).
2. Luster.
3. Uniformity of shade.
4. Stability of lacquer in solution after application.

In the paint and varnish finishes formerly used, it was considered desirable to employ as little coloring pigment as possible, a coat of clear varnish being relied upon to protect the under coats. In pyroxylin lacquers, however, pigment serves a structural need. It is necessary to have sufficient pigment to insure a film that will protect the vehicle part of the lacquer against the decomposing action of actinic light, the ultra-violet portion of the solar spectrum.

Durability to a large extent is dependent on the amount of such protection furnished—in other words the pigment content. While it would seem from this that colors which are opaque in the ordinary sense provide the most durable lac-

Characteristics of Base Pigments in Pyroxylin Lacquers

*These hold strictly true only when pigments are used alone.
If several pigments are combined characteristics
will be different*

Base Color	Type of Pigment	Durability	Luster	Covering*
BLUES:	Iron	Good	Good	Good
	Lakes	Good	Good	Good
	Ultramarine	Poor to Fair	Poor	Poor
GREENS:	Chromes	Good	Good	Very Good
	Lakes	Poor	Fair	Poor
YELLOWS:	Chromes	Good	Good	Fair
	Lakes	Good	Good	Good
REDS:	Para	Fair	Good	Good
	Lithol	Fair	Good	Good
	Toluidine	Fair	Good	Very Good
	Indian	Good	Good	Good
	Tuscan	Poor	Good	Fair
MAROONS:	Lakes	Poor	Poor to Good	Poor to Fair
	Alizarin	Fair	Good	Good
	Toners	Poor	Poor to Good	Good
EARTH COLORS:	Umbers	Good	Fair	Poor
	Siennas	Good	Fair	Poor
	Ochres	Good	Poor	Fair
BLACK:	Carbon	Good	Good	Good
	Bone	Fair	Fair	Fair
WHITE:	Titaniums	Good	Good	Good
	Zinc Oxide	Good	Good	Fair
	Lithophone	Fair	Fair	Fair

*Covering characteristics are relative only in the individual color groups. For instance, Reds and Blues are not comparable.

quers, such is not always the case. While opaque colors in general stand up better than those of lower capacity, some of them actually do not furnish as much protection against actinic light. Among these para toners are prominent. While more opaque than madder lakes, they make up into less durable lacquers, as they do not render the vehicle impervious to the action of actinic light.

In general, the majority of the base pigments which have proved satisfactory in paint and varnish finishes have also proved satisfactory as base pigments in lacquers. Both organic and inorganic coloring pigments can be and are used. The question of luster, however, has created some difficulties. In the first days of pyroxylin lacquer, pastel shades were widely used as these were readily applicable. With an increasing demand for richer colors, the question of obtaining sufficient luster became more prominent with some pigments. Some earth colors are notably hard to produce in pyroxylin lacquers with a good lustrous finish, although their durable qualities are very high. In working up lacquers with these colors, toning pigments have to be used which will offset this undesirable characteristic.

Some colors when used in lacquers present a problem on the basis of uniformity. Blues and greens are notable among these. Colors of these pigments will change in shade over a period of a week in solution, presenting a problem of keeping shades uniform. A dark blue which was mixed a week ago with a pastel sample, and the same color mixed with the same paste a week later in the same proportions, will produce different shades on application. Allowing both to stand for another week, however, will practically even out differences in shade. Difficulty is encountered in this method, however, due to the settling of pigments and need of sufficient agitation to produce proper mixing before use.

There are quite a number of theories extant as to the cause of such color changes and difficulty of obtaining uniformity. One of these is that various pigments have the property of being wetted with the lacquer vehicle. While this property is desirable in some cases, it causes changes in tint on blues and greens. This problem is not a new one with lacquers, however, and has merely been emphasized through the increased importance of pigments in pyroxylin finishes. These pigments in paints and varnishes have the same general characteristics, although less pronounced in practical application.

White pigments are very durable. Three different types are used in lacquer finishes, titanium pigments, zinc oxide and lithophone. Zinc sulphide is undesirable as it turns brown on exposure.

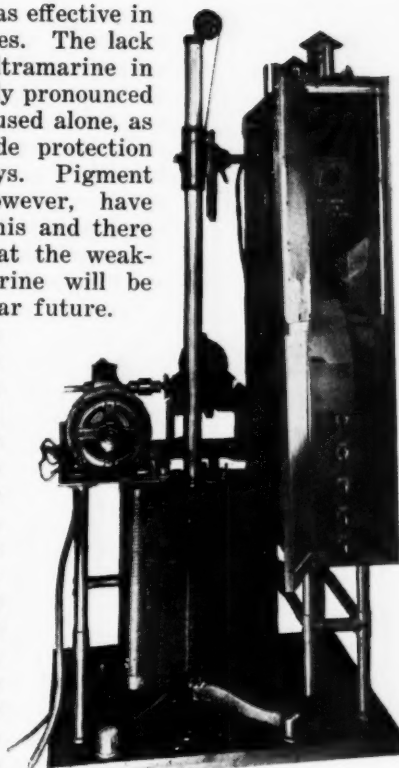
Of the blues which are used in pyroxylin lacquers, iron blues and a few blue lakes have good characteristics. Ultramarine has not been used successfully to

date, although it was effective in paints and varnishes. The lack of durability of ultramarine in lacquers is especially pronounced when this color is used alone, as it does not provide protection against actinic rays. Pigment manufacturers, however, have been working on this and there is a possibility that the weaknesses of ultramarine will be overcome in the near future.

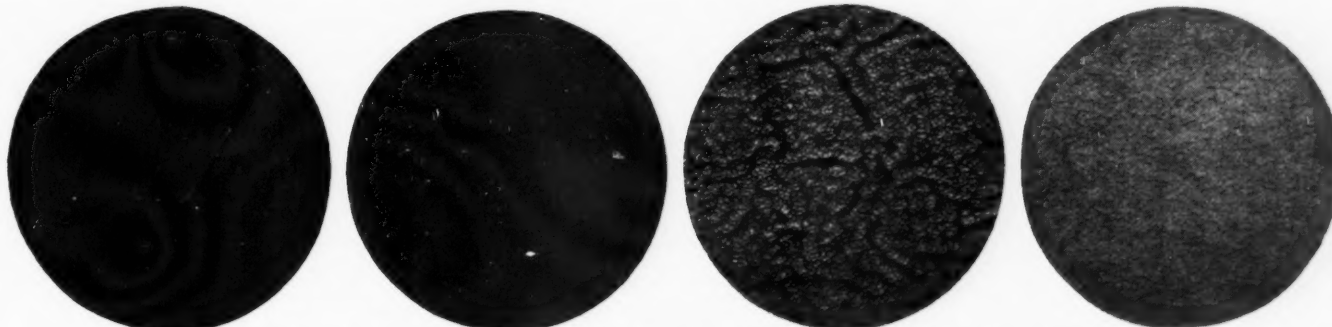
Chrome greens are adaptable to lacquers, as are chrome yellows and oranges. Yellow toner has an advantage over chromes, however, in that it is more opaque. Both carbon and bone black are being used and are satisfactory. Carbon black, due to its greater strength as a covering, has the advantage, however, and has been more satisfactory in most cases. Reds and maroons at first presented considerable difficulty in pyroxylin finishes as they provided no protection against actinic rays. Considerable development in these pigments has enabled both to be used with satisfactory results through the introduction of other toners and solid matter.

With true lake colors, alizarin pigments produce the most durable so-called lake colors in pyroxylin lacquers. But as they have poor covering qualities, such lacquers have to be strengthened with other material, which again may detract from durability, while lythols can also be used. Bordeaux, which was widely used in paints, has very poor qualities in pyroxylin lacquers.

There has been considerable discussion in the past



The Ditzler Color Company accelerated weathering machine for pyroxylin lacquers. The result of two years of average service is reproduced by this machine in 336 hours. A 160-volt Cooper-Hewitt mercury quartz bulb and a variable level distilled water tank imitate rain and sunlight cycles once every 30 minutes



Micro-photographs of characteristic pyroxylin lacquer failures, multiplied 85 diameters, from samples run in the accelerated weathering machine. (1) Shows a failure due to too much or the wrong kind of resin, and is designated as a "crowfoot" check. (2) Deep chalking is occasioned by slightly unbalanced lacquers, due to vehicle or pigment solids. (3) Contraction of the lacquer due to improper pigment combinations for the vehicle used. (4) Surface chalking similar to this represents the normal wearing away of good lacquers. Polishing brings such a sample back to its original appearance

as to the best method of attacking problems in connection with pyroxylin lacquer development. Although some of the reactions of finishes, especially those due to actinic light, might be designated as of the chemical type, the Ditzler Color Co. after considerable investigation has concluded that physical investigation offers the best chances for definite results. This theory has been based on the fact that although some changes are chemical reactions, their causes are purely physical. Working from this basis, the conclusion has been reached that deterioration of finishes is due chiefly to the action of water and the actinic rays of sunlight, and especially the combination of these two factors.

Testing Machine Developed

As a result of these investigations a testing machine has been developed by the Ditzler company, based on a similar device constructed and used at the General Motors Research laboratory. The machine consists mainly of fairly large diameter wheels on which small coated sheet steel samples are mounted. The wheel is rotated at about two revolutions per hour by means of an electric motor through a series of worm reduction gears. The coated samples on the wheel at the bottom of the cycle of rotation dip into a tank of water, emerging from which they are exposed at the top of the cycle to the rays of a Cooper-Hewitt light. Water levels in the tanks and distance of the light source from the wheel are variable in order to enable the simulation of different weathering combinations. It is estimated that with this apparatus conditions are produced which will in 336 hours of continuous running have the same effect on coated samples as two years of average service conditions.

The efficacy of this machine has been demonstrated repeatedly. In one recent case, for example, a car had been finished in a new and untried color. A test panel was coated with this lacquer by the car manufacturer and placed on the machine for test, while another specimen was placed on the roof of the car plant for weathering. The sample on the machine showed definite indications of checking after 142 hours of testing. The sample on the roof showed signs of deterioration after four months. Two months later the car came back to the factory with a kick about the finish—as expected after failure of the sample. As a result of investigations in the meantime, it was possible to refinish the car with a durable lacquer.

Much Yet to be Accomplished

In spite of the extensive researches in the pyroxylin lacquer field, considerable remains yet to be accomplished. It has been impossible as yet to obtain certain ranges of colors in lacquer finishes which will have the right combination of durability, luster and uniformity. While researches in pigments will undoubtedly help to solve a number of problems, there is also a possibility that research in the vehicle part of the lacquer will produce developments offsetting undesirable pigment characteristics, rendering the vehicle part itself impervious to the action of actinic rays, while still providing good luster.

That a panacea for all ills in the lacquer field might be discovered is extremely doubtful. The solution will probably lie along lines of proper combinations of known factors.

Developments along this line are aided materially by the elimination of a problem which was quite prominent in the paint and varnish finishes, that of obtaining correct balancing of elasticity of the various coats. In varnish finishes, exposure to weather had the effect of

steadily decreasing elasticity. This made it imperative that final finishing coats be of very high elasticity to allow for continued oxidization. As soon as these coats dropped in elasticity below those of the pigmented under coats, which generally represented a period of about a year, checking set in. In lacquers a static state is established about 30 days after application and but little change in elasticity occurs thereafter. This has made it possible to make all coats of pyroxylin finishes of approximately the same elasticity, and fix this at the most desirable point.

From the automobile manufacturer's point of view, two problems have been quite prominent, the lacquering of wood wheels, and fabric bodies and tops. The lacquering of wood wheels is made difficult by the necessity of providing primer coats equally good on the metal felloes and the wood spokes. To date this has been obtainable only with primers having a slow drying period. The problem of coating artificial leather tops and fabric bodies seems to have been solved, however. The difficulty here was to obtain a finish which could be sprayed on. Formerly only high viscosity nitro-cellulose lacquers could be used, and these could be applied only by a scraper, with the material passing over rolls, a method inapplicable to finished bodies and tops. Lacquers are now available which can be sprayed on and which are flexible enough to prevent cracking.

Reconditioned Belting

THE Cleveland Oak Belting Co., Cleveland, Ohio, announces that it has opened a service in that city, and will extend it to other cities soon, which will make use of greasy and oil-soaked and apparently useless bits and ends of leather belting in a reconditioning process which is expected to result in good, serviceable belting at about one-third the cost of new belting.

The first step in what is called the Nu-Ply process, after sorting out those pieces which are too far gone to be worth reconditioning, is to open the plies and joints and remove the cement from them. Then all grease and dirt are removed and the pores of the leather opened up. The essential oil is restored next by immersion and currying after which the pieces are assembled into commercial lengths of belting which, it is claimed, are quite as serviceable as brand new belting. The outer plies of reconditioned belts are made from new oak tanned leather in order to give them the proper strength and to prevent stretching.

THE Link-Belt Co., Chicago, Ill., announces that it has developed a series of Hex-Top compression grease cups equipped with Alemite or Zerk fittings. The combination of compression grease cups with the fittings is said to be an improvement over either article used separately. Filling can be done without waste of grease and in the most inaccessible places where grease cups seem often to be located while an occasional slight turning of the six-sided nut by wrench or hand keeps bearings lubricated during long periods between refillings.

BEGINNING with the fall term of 1927, the Mechanical Engineering Department, University of Pennsylvania, will include a course of Fuel Engineering leading to the degree of Master of Science in Fuel Engineering. The course, of one year duration, will include lectures and field work embracing such subjects as fuel resources, mining methods, manufacture of special fuels, uses, sampling, testing of fuels, etc.

Just Among Ourselves

Big Car Producers Handle No Accessories

AFTER some two or three years of experimentation, there seems to be little active growth in the tendency for car manufacturers to go into the accessory distributing business on a large scale. A few are distributing almost a full line of accessories, it is true, but a large proportion of the 1926 output, exclusive of Ford, consisted of cars built by companies which handle no accessories for resale whatever. A survey just completed by a Chilton Class Journal Co. investigator, covering 15 makers who last year built 2,200,000 cars, shows that eight of the 15 who *do* handle accessories built 830,000 cars, while the seven who *do not* built 1,365,000 cars. Two of the factories which do not now handle accessory items, it is interesting to note, did distribute such units for resale a year or so ago.

* * *

Jobber Usually Able to Give Better Service

IT'S worth noting also that accessory sales per car even among the eight factories engaged in such distribution are quite low in several cases, and large enough to be of major importance in only a few instances. One company shows only \$5 per car, for example, while two others show \$12 and \$15 respectively. One company does sell \$38 worth of accessories per car and has its accessory merchandising activities far more highly developed than have any of the other factories included in the survey. There is much that is said both for and against the distribution of accessories by car manufacturers, but the weight of opinion in the field at present would seem to be against extensive

pursual of activities of this kind. We incline strongly to agreement with the statement of one merchandising expert which we heard the other day to the effect that "While it is true that a car maker with a fairly well established parts distribution may handle accessories at a lower cost through these channels, it is also a fact that the service he renders never can equal, either so far as the bumper manufacturer or the car owner is concerned, the service rendered by the jobber."

* * *

A Campaign That Ought to Succeed

SOMETHING to get enthusiastic about to our way of thinking is the campaign which the Detroit Automobile Club, the Western Michigan Motor Club and the A. A. A. are waging against motor speed traps administered irregularly in many cases and to the unfair annoyance of motor car drivers in practically every case. We're in hearty agreement with the thought expressed by E. L. Cord the other day that if local communities now operating speed traps would put into efforts to regulate and handle traffic systematically and fairly the same amount of time, thought and energy now consumed in trying to catch stray dollars, those same communities would be far better off from the standpoint of having their highways safe and sane. Personally we could never see any great profit to a town anyhow in consistently creating ill-will among hundreds of transients every day. There is one speed-trap town through which we have to drive with fair frequency and our feeling is that if we blew all four tires while passing through we'd drive 10 miles on

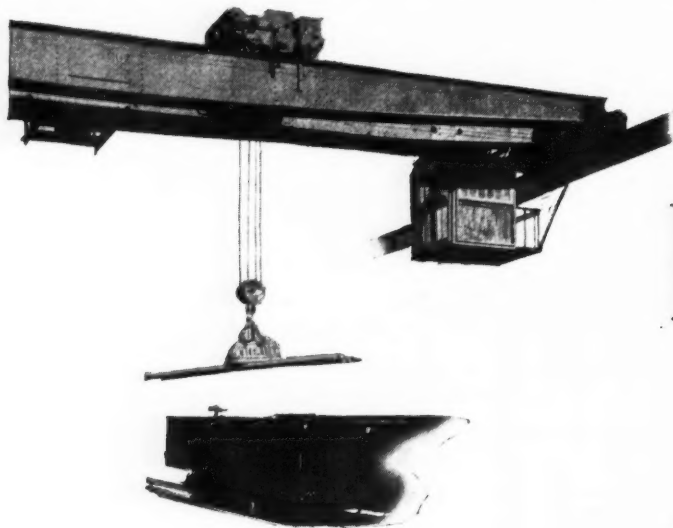
the rims if necessary to avoid passing on any money to the merchants of that village. Probably under the circumstances we wouldn't do any such thing, as a matter of fact, but we'd feel like it just the same.

* * *

Prizes for Technical and Trade Literature

PRIZE plays, prize books and prize lotsofthings have been common in recent years. Often these prize awards have brought considerable criticism on both judges and donors, but it is our belief that in certain lines of endeavor at least they have a very real and very useful function. Two proposed awards recently announced have interested us particularly and both seem to us to be in this class of highly desirable contests. The Woolson \$100 award for the best paper submitted to the Society of Automotive Engineers before April 20 should be a definite stimulus toward the preparation of really sound and noncommercialized engineering presentations and should help materially to concentrate the attention of engineers on the value and importance of keeping to a high professional standard their public utterances. The Associated Business Papers has offered three \$500 awards this year for the best news article, the best editorial article and the best series of articles published in trade and business papers between July, 1926, and July, 1927. These awards also tend to promote a professional pride among the business paper editorial men of the country which should react quite favorably both on the quality of work in specific instances and on the value of that work to the industries served by the business publications.—N. G. S.

Material Handling and *in Factory* INFLATED



By W. L.

MATERIAL handling and maintenance present outstanding fields for production economies in most automobile plants. The first of these has been kicked up and down the field with utmost abandon and the second is just beginning to assume warranted prominence in the production mind. While both of these items are recognized by all production men, neither has received due measure of attention because of its relative oblivion in the overhead account.

Material handling is an individual problem for any particular plant, as the correct type of equipment must be based first, on the physical characteristics of the plant, and second, on the nature of the product. The general condition of incoming product and the scope of process within the plant also are important angles. In the past, mechanical equipment for handling material at the process lines has been overemphasized to the point of wasteful extravagance while too little attention has been given to the handling of raw and semi-finished materials entering the plant and their delivery to the points of operation.

Economics Largely Ignored

Economics has not governed the purchase and installation of a great amount of handling equipment. In many instances, the interest on the investment for this equipment is not offset by anything like an equivalent saving of labor charge. In other cases human horsepower has been diverted from more profitable process labor. What is needed most seems to be more careful engineering analysis which will determine the actual productive and financial value of handling equipment.

Specialists in the handling of materials have estimated that for every ton of finished product produced in this country, as high as 225 tons are handled in some form. At the present rate of production, the automotive industry turns out about 8,500,000 tons of finished product in the form of vehicles per year. On a conservative basis, component material, including scrap loss, is handled no less than 30 times from the entrance to the shipping platform. On the basis of a saving of one cent per ton of handling charge, the economical possibilities

are attractive. One of the easiest ways to reduce the handling burden is by the combination of operations.

Another indication of the well-defined trend toward a new conception of automotive production is the attention which maintenance is being given at the present time. Like the poor, maintenance labor and expense probably will be with us always, but study of its importance and effect not only on present-day overhead but also its disruption of manufacturing schedules, unit costs and budgets will develop a pronounced source of production economy.

Heavy Maintenance Burdens

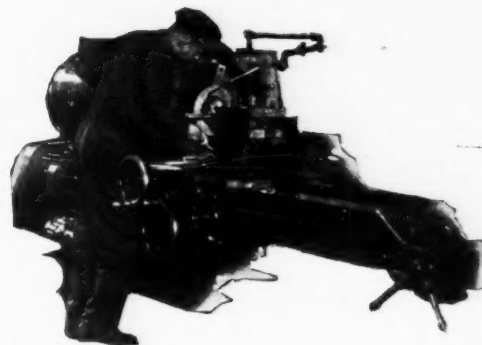
In one case where one operator runs two grinders, the maintenance charge has been approximately \$3 apiece per day. On the basis of existing wage rates, this operator earns about \$6 per day. No computation is necessary to show that the maintenance burden alone is 100 per cent and that one item which ordinarily is buried in the overhead account doubles the actual cost of every piece coming out of these machines. This example may be extreme but it can be wagered that its equal will be found in many plants and that a lot of cases approach the same magnitude. Things of this sort constitute another good reason for dragging maintenance and similar work out of their obscurity in an aggregate burden account and tying them up with the day-to-day labor cost of running a plant which is producing so many finished units.

Potentially, the machine tool and equipment builder is the most powerful factor for the reduction of maintenance cost. A large share of existing high maintenance charges is due to tinpot countershaft design. Individual electric motors will kill a lot of this trouble. Oil holes are put in cruel and unusual places, it seems, for the chief purpose of making the operator play hide and seek at the cost of productive time and many are so well concealed that the operator is bound to lose the game. Then the machine goes bad, ties up the line, entails maintenance cost and the worse burden of idle equipment and "busted" schedules.

Chip clearance is another factor which the machine tool builder can think about to everybody's advantage. The disposition of cutting compound and insurance against its entrance into oil cups and other lubricating

Maintenance Loom Large *Dilemma of* OVERHEAD

Carver



points is another. The protection of ways, particularly in conjunction with moving carriages, etc., offers another big field for the machine tool builder to reduce maintenance difficulties.

Automotive production men are beginning to talk maintenance and are looking for maintenance which is built into the machine. Alloy steels, anti-friction bearings, electric drive hydraulic feed and the steps which have been taken in the direction of protecting the vital bearing surfaces of the machine are just the first signposts along this road. With these can be ranked the efforts which have been made toward making machines more foolproof.

Built-in Maintenance

The installation of sight feed and reservoir lubricating systems on machines which are not equipped adequately is almost general practice in the industry. Other corrections such as splash guards which perform their nominal functions are being made quite generally. Before long machine tools will be scrutinized from the maintenance angle as well as from the angles of price and output when new equipment is under consideration. Built-in maintenance is doubly effective in insuring output. Anticipated schedules then will be not a matter of one good day's output but a regular day-in-and-day-out affair.

With the increasing necessity for making a net profit on the car all along the line, instead of tacking on the desired tariff after the job has been done in the most expedient way, some method of anticipating how projected capital investment is going to pay out will become almost imperative. Particularly is this true in the face of rapidly diminishing opportunity for marked savings in the present standard of direct labor expenditure.

Primarily any business venture is organized for the purpose of producing an adequate profit on an investment of capital. The employment of labor is only incidental to this idea. The purchase and use of buildings, machine tools and equipment of all kinds form the physical structure of the idea and therefore are subject to the same principle of showing an individual commensurate profit.

To evaluate the investment value of any piece of equipment, three stages are required.

1. Analysis of the purely mechanical value of the equipment to determine that the required production and standard of quality will be obtained.

2. Economic evaluation or comparison of this equipment as related to previous or competitive equipment.

3. Interpretation of these results from the investment and profit angles.

An interesting sidelight on this need for a method of analyzing equipment is presented by an eastern manufacturer. He says, "Engineers have felt for a long time that as a class, considering their creative thought and work, they were underpaid. However, there is a very good reason for this condition. Ninety-nine out of 100 can figure a thing through and show how it should be made and how much it will cost, but in practically every case a financial man will have to be brought in before the project pans out and then on different terms than were presented originally."

The Income Value

The job of figuring a proposition through belongs to the engineer or production executive and to do this job he must include all factors with each in its proper perspective. To analyze thoroughly the value of any piece of equipment requires not only an appreciation of its mechanical value but some definite idea of its position as an investment. Figures must show the income or profits value of the investment as compared with optional possibilities. In any process of this kind, the importance of getting rid of the present practice of lumping everything but direct labor into the overhead account, will be apparent.

Too much cannot be said about the distortion of ideas of cost of operation which follows the aggregate lumping of all but direct labor expenses into overhead. While most plants split expenditures into various accounts, the production department must face the issue squarely and focus attention on some of these accounts with the idea that they are an integral part of the production cost. Also that they are the most fruitful source of additional manufacturing economies.

Brinell Hardness Estimated Closely From Rockwell Numbers

Semiempirical formulas used in Bureau of Standards study found to be accurate within 10 per cent. Tensile strength of ferrous metals also determined from Rockwell numbers.

AN investigation to establish the relationship between the hardness numbers obtained with the Brinell and the Rockwell hardness testing machines has been made at the Bureau of Standards, Washington, D. C., and is dealt with in Technologic Paper No. 334, by S. N. Petrenko.

With the Rockwell machine, either a ball or a cone is used to produce an indentation of the material to be tested. A constant minus the depth of the indentation is called the Rockwell number, and this is read off directly on a dial. There are two scales on the dial, the C scale for use with the cone, and the B scale for use with the ball.

For the same material the Rockwell B number is different from the Rockwell C number and neither of them is the same as the Brinell number. Often materials engineers wish to compare the hardness of two materials, knowing the Brinell number of one and the Rockwell number of the other. It is also sometimes desirable to be able to compare the indentation hardness of two materials, for one of which the Rockwell B number, and for the other, the Rockwell C number, is known.

Methods of Measurement Differ

The indenting tools, the loads, and the methods of measuring the indentation in Brinell and Rockwell machines are so different that no accurate conversion formula for all classes of materials can be expected to exist. Nevertheless, in general, materials giving relatively small indentations for one type of indenting tool give relatively small indentations with other types of indenting tool and other magnitudes of load. Therefore measurements made with one tool or load may within certain limits of accuracy be used to estimate the result which would be obtained with another, and, in addition, for ferrous materials at least, materials having high tensile strengths have been found to have relatively small indentations (high indentation numbers) and vice versa.

Data on Rockwell and Brinell numbers in the possession of the Metallurgical Department of the Bureau of Standards was placed at the disposal of the author. The investigation involved a comparison of the Rockwell and Brinell numbers for a large number of different materials, and of the Rockwell numbers with the tensile strength, with a view to finding an analytical relation between them. Limits of accuracy attainable in using one of these numbers for estimating the other, or the tensile strength, were also investigated.

Only exceptionally did any of the computed values of the Brinell number differ from the observed Brinell numbers by more than 10 per cent, and these exceptional cases were usually for very hard or very soft materials. The average deviation was less than 5 per

cent. The few deviations in excess of 5 per cent found in materials of medium hardness were caused probably by lack of uniformity of material.

The following conclusions were drawn from the results of this investigation: (1) For all the metals tested, the Brinell number may, within an error of plus or minus 10 per cent, be estimated from the Rockwell numbers, using the following semiempirical formulas:

$$(a) \quad Bn = \frac{7,300}{130 - 100R_{B1/16}} \text{ for } 100R_{B1/16} \text{ from } 35 \text{ to } 100$$

$$(b) \quad Bn = \frac{1,420,000}{(100 - 150R_c)^2} \text{ for } 150R_c \text{ from } -20 \text{ to } 40$$

$$(c) \quad Bn = \frac{25,000}{100 - 150R_c} \text{ for } 150R_c > 40$$

$$(d) \quad Bn = \frac{3,710}{130 - 100R_{B1/8}} \text{ for } 100R_{B1/8} \text{ from } 0 \text{ to } 120$$

The average errors of the values obtained from the formulas was about 5 per cent.

(2) For ferrous metals the tensile strength may within an error of plus or minus 15 per cent be estimated from the Rockwell numbers using the following empirical equations:

$$(a) \quad \text{Tensile strength} = \frac{3,750,000}{130 - 100R_{B1/16}} - \text{lbs./in.}^2$$

for $100R_{B1/16} < 90$

and

$$\text{Tensile strength} = \frac{3,750,000}{130 - 100R_{B1/16}} - \text{lbs./in.}^2$$

for $100R_{B1/16}$ from 90 to 100.

$$(b) \quad \text{Tensile strength} = \frac{730,000,000}{(100 - 150R_c)^2} - \text{lbs./in.}^2$$

for $150R_c < 10$

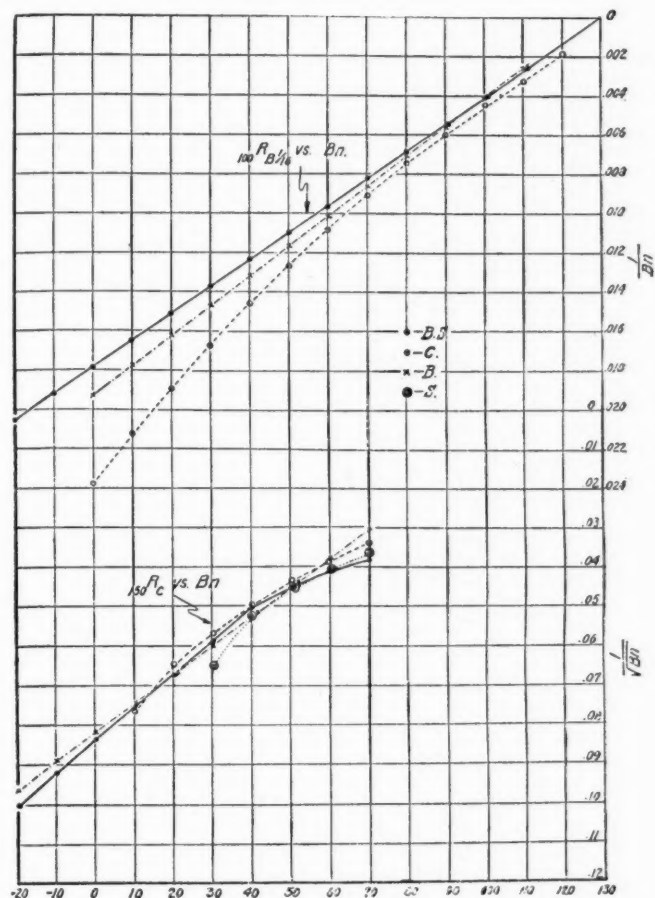
and

$$\text{Tensile strength} = \frac{695,000,000}{(100 - 150R_c)^2} - \text{lbs./in.}^2$$

for $150R_c$ from 10 to 40

and

$$\text{Tensile strength} = \frac{12,250,000}{100 - 150R_c} - \text{lbs./in.}^2 \text{ for } 150R_c > 40.$$



Relations between Rockwell and Brinell hardness numbers which were obtained by various investigators

The average errors of the values obtained by these formulas was less than 10 per cent.

(3) For non-ferrous metals no discernible relationship was found between any of the indentation numbers and the tensile strength.

Several other investigators have dealt with the same subject. S. C. Spalding (Transactions of the American Society for Steel Treating, Oct., 1924) experimented with high speed steels with a tungsten content of 17 per cent, which were drawn at different temperatures. The results showed that within the range of 300 and 650 the Brinell number is approximately proportional to the Rockwell cone number. No conversion formula was recommended, but the relationship between the Rockwell cone number and the Brinell number may be roughly expressed by the equation

$$Bn = 12.5 R_c - 137.$$

I. H. Cowdrey (Transactions of the American Society for Steel Treating, February, 1925) tested a great variety of ferrous and non-ferrous materials, including over-strained, cold-worked and heat-treated material. He derived the following equations:

$$Bn = \frac{100R_{B1/16} + 273}{6.49 - 0.048 \cdot 100R_{B1/16}}$$

$$Bn = \left(\frac{150R_c + 192}{88.3} \right)^{6.21}$$

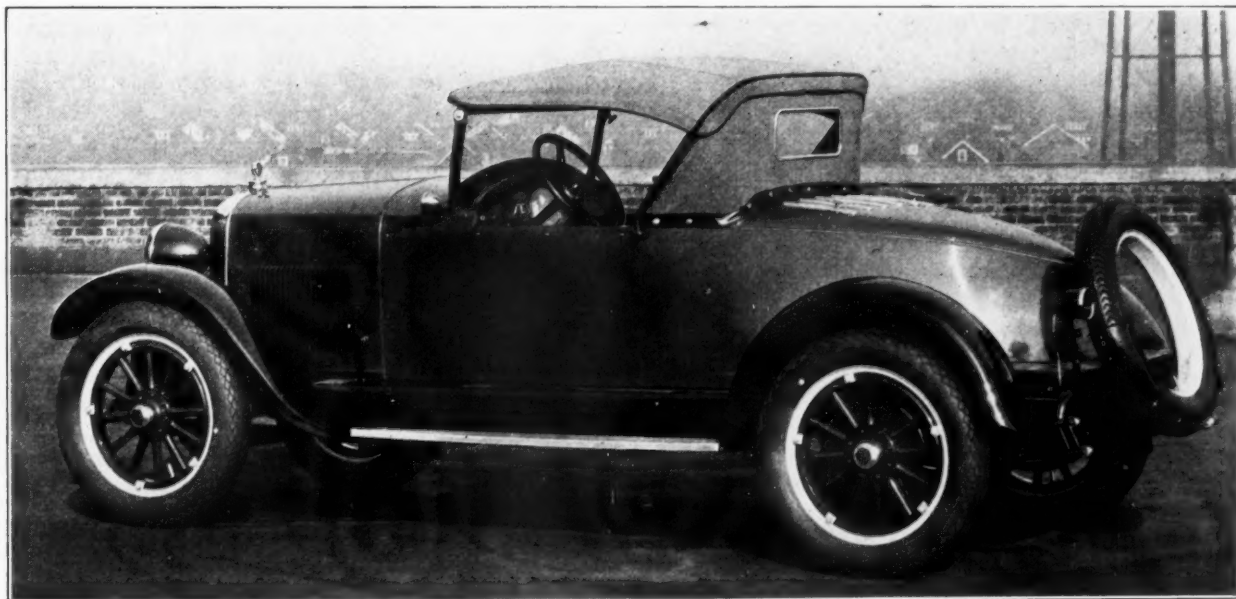
R. C. Brumfield (Transactions of the American Society for Steel Treating, June, 1926) made tests on non-ferrous materials and differently treated steels. He derived the following equations:

$$Bn = \frac{6,600}{127 - 100R_{B1/16}}$$

$$Bn = \frac{1,880,000}{(112 - R_c)^2}$$

In the chart reproduced herewith the values obtained by the different experimenters are compared. Points marked BS relate to values obtained at the Bureau of Standards in connection with the work dealt with in the paper under review; C are values obtained by Cowdrey; B by Brumfield and S by Spalding.

The New Essex 70 m. p. h. Speedster Model



The latest addition to the Essex line is the Speedster which is geared for a speed of 70 m.p.h. and sells for \$700

Northern Tropical America Could Supply World's Rubber

U. S. Government survey shows over 6,000,000 acres of land in this area suitable for Hevea planting. Might be developed to produce 800,000 tons a year. Labor shortage only obstacle.

WITHIN five to eight days of New York Harbor by boat are regions which offer 6,000,000 or more acres of land as suitable for rubber culture as the lands now used for that purpose in the Middle East.

If this acreage were under cultivation and producing at a nominal rate (300 lb. per acre per year), the total annual yield would be about 800,000 long tons of rubber, or something like 200,000 tons more than is produced in the world at the present time.

The authors of a 375-page report on "Possibilities for Para Rubber Production in Northern Tropical America," which has just been published by the U. S. Bureau of Foreign and Domestic Commerce as the sixth of a series of publications growing out of instructions from Congress "to investigate and report on the possibilities of developing the plantation rubber industry in the Philippines and Latin America," did not go so far as to make the estimate in the preceding paragraph. But they did state that the area in northern tropical America suitable for rubber growing is 6,000,000 acres, and from other facts and figures set forth it is quite easy for the reader to do his own estimating.

It is not to be expected, however, that the great rubber producing possibilities of this vast area will ever be fully realized. Not in our generation, at least. The authors of the report—John C. Treadwell, special agent, and C. Reed Hill, assistant, of the Department of Commerce, and H. H. Bennett, soil scientist of the Department of Agriculture—make it plain to the reader that there are various handicaps to any very rapid development of the territory. Chief among these are the shortage of labor and scales of wages considerably higher than those

obtaining in Malaya and the Dutch East Indies. It is not stated specifically but may be inferred that it would be economically impracticable, even if possible, to put the entire available acreage into production, as the attendant increase in the supply of crude rubber would so reduce market prices as to wipe out all margins of profit and nullify the entire project.

Such development as is done, therefore, will have to be synchronized to the growth in rubber consumption in order to maintain a safe balance between supply and demand and to keep crude rubber prices stabilized at a reasonable level.

The importance of this is seen in the statement that the cost of production in northern tropical America will be around 32 cents a pound as compared with a cost of 18 to 20 cents in the Middle East at the present time.

With rubber selling at 35 cents a pound the American producer would have a 3-cent profit margin. Thus, with an investment of \$100 per acre and a yield of 300 lb. per acre, the return would be 9 per cent. This is assuming that the plantations were maintained in first class condition. By skimping on maintenance the planter might be able to increase his profits to 10 cents a pound. There is also a possibility that a yield of 400 lb. per acre could be reached. On the other hand, investment costs in some cases might be \$200 per acre instead of \$100.

There are 21 countries in the territory covered by the report. These are: Mexico; the Central American countries of British Honduras, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Panama Canal Zone and Salvador; the South American countries of Colombia, Ecuador, British Guiana, Dutch Guiana, French Guiana and Venezuela; and Cuba, Dominican

Northern Tropical America



In the blackened portion of the map, which includes Mexico, Central America, the West Indies and a section of South America, are 21 countries which contain more than 6,000,000 acres of land as suitable for rubber culture as the lands now used for that purpose in the Middle East. More rubber than is now grown in the world could be raised on this acreage

Republic, Haiti, Jamaica, Porto Rico, Trinidad and Tobago, and the Virgin Islands in the West Indies.

Twelve of these regions are listed as having acreages definitely desirable for the growth of Hevea rubber, as follows: Southern Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, Venezuela, the Guianas, Haiti and Trinidad.

Mexico, Costa Rica, Panama, Colombia, Venezuela and western Ecuador could each be expected to offer a million or more acres of suitable land. Smaller areas are available in the other countries.

Rubber is not a new product to these countries. Castilla is indigenous to most of them and many attempts have been made to develop it commercially. The plantations have languished, however, as the rubber is inferior to that of Para, produced by the Hevea trees, and therefore commands a lower price; also the yield is low, as the Castilla tree does not lend itself to frequent tappings.

The investigators studied the possibilities for Hevea growth from the standpoints of topography, altitude, moisture and existing types of vegetation and found conditions as a whole favorable to its culture. They also studied the progress of Hevea plantings which have already been made in Trinidad, British and Dutch Guiana, Mexico, Nicaragua, Costa Rica, Panama, western Ecuador, Haiti and Cuba. Excepting in the Guianas and Trinidad, where the plants were attacked by the South American leaf disease, which is said to have had its origin on a wild species of Hevea in the neighboring forests, the trees were in a healthy state. Tappings which were carried on at Bayeux, Haiti, by the U. S. Department of Agriculture, indicated a yield nearly as good as the average of the Middle East.

Advantages Over Middle East

As compared with most of the areas now available for new planting in Malaya and Sumatra, northern tropical America, the report says, has the following natural advantages:

1. The cost of land is low (\$1 to \$5 an acre).
2. Transportation facilities have already been arranged in many districts, and others have satisfactory water transportation.
3. The soil in certain areas is superior to that now to be had in the Middle East.
4. There are available some areas clear of virgin jungle and others entirely or nearly clear of second-growth jungle.
5. There are no destructive grasses to combat such as the lalang, or cogon, grass of the East.
6. Some lands have soils and topography suitable for the use of plows.
7. If lands formerly cultivated are used, the hazards from root diseases are nil or greatly reduced.

The only important disadvantage found by the investigators was the scarcity of labor and ways of overcoming this obstacle are suggested. The most direct way, of course, is by immigration. Some of the West Indian islands have the only appreciable quantity of surplus labor in northern tropical America, but the entire surplus would hardly exceed 40,000 workers at the most. The importation of laborers from Asia, more specifically China, would be the logical solution and it is believed that certain of the Governments concerned would admit Asiatics under certain restrictions.

The native population of most of the countries where the conditions for rubber cultivation are favorable is concentrated in the highland regions, whereas the acreage best suited for Hevea growth is in the lowlands.

Daily wages in the various countries range from 25

cents in some coffee and cacao districts to \$1 and \$1.50 in the lowlands and coastal banana regions. It is in these latter regions that the rubber acreage is found and rubber plantation wages therefore would be on the higher basis. In the Middle East the basic wage is practically 20 cents a day and the total charges (including sanitation, housing, etc.) against labor are from 35 to 40 cents a day. The general tendency in the Middle East, however, is toward higher wages, and this may be expected to decrease the disparity now existing between those countries and northern tropical America.

Labor at \$1 a Day

If the acreage planted in some localities of northern tropical America were kept within the limits of the local labor supply, it is believed it might be possible to hold wages below \$1 per day. Labor costs are also subject to some reduction through commissary operations of company stores, as is customary with the large fruit companies. If plantations were started on a small scale at separated points and extended slowly, with appropriate attention to the comfort and welfare of the workers, it is possible that sufficient labor could be secured in the rubber districts to allow for steady development. In this connection it is pointed out that tapping, for which large amounts of labor are required, is light work and is finished in half a day. Such work might make a strong appeal to labor, especially if good sanitation were arranged for. Under such conditions labor might be willing to work for a lower daily wage than that prevailing in the lowlands today.

The investigators also suggest the encouragement of native production as a means of overcoming certain phases of the labor problem. The establishment by foreign capital of rubber plantations of, say, 5000-acre units in favorable localities throughout tropical America, would furnish a basis for the development of native rubber culture. The idea in the case of rubber would be the same as in the case of crops like sugar cane and bananas where natives are encouraged to plant under contract with the so-called "central."

While climatic and soil conditions in designated regions of northern tropical America are comparable with those of the Middle East and the few plantings of Hevea indicate that the trees will grow well and produce latex, the production of rubber per tree or per acre can not be foretold. It may be more or it may be less than the average for the Middle East. Until rubber is planted and brought into bearing the danger from diseases of all kinds can not be gaged. Even jungle lands may be free of root diseases, but on the other hand new diseases as yet unknown to Hevea planters may appear. Except in Brazil and the Guianas the South American leaf disease is absent.

Cheapest Method Recommended

On account of these uncertainties, the report says, the cheapest methods of planting and bringing the first trees into bearing might be a wise policy. Later plantings could be adjusted to meet new conditions in the light of the experience thus gained.

All of the regions where climatic conditions are favorable for planting rubber are strategically located with reference to markets. None of the ports of shipment are farther than eight days from New York, and some are nearer. This means that rubber produced here would have the advantage of being at least a month nearer the United States than is the rubber grown in the Middle East. The nearness of the regions, it is pointed out, would be an especial advantage in time of war, when supplies from the East might be cut off.

NEW DEVELOPMENTS—Automotive

Automatic Shut-Off Valve

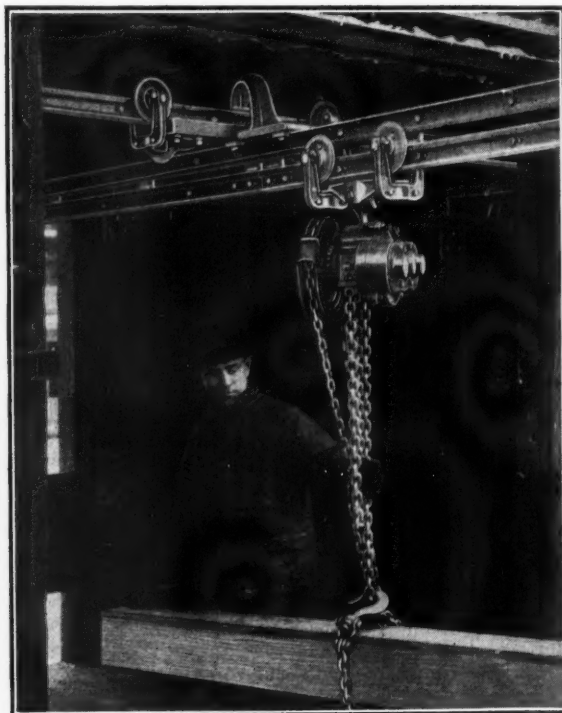
TO eliminate a fire hazard which is often present in plants where oil fuel is employed, the Fluid Heat Corp., Baltimore, Md., is marketing the Lalor Automatic Shut-Off Valve which is designed to permit a predetermined maximum flow of oil and to instantly close when the flow is in excess of this maximum, as would be the case with a broken pipe or fitting or defective valve.

Installed in a 1 in. pipe line operating at 100 lb. pressure, it is said that a 1 in. valve will permit only 1 pt. of oil to escape should there occur a break in the line. After a valve has closed automatically it must be opened manually after the break in the line has been repaired. This device has been approved by the Underwriters Laboratories among other testing organizations. Valves suitable for flows from 2 gal. to 5000 gal. per hr. are available.

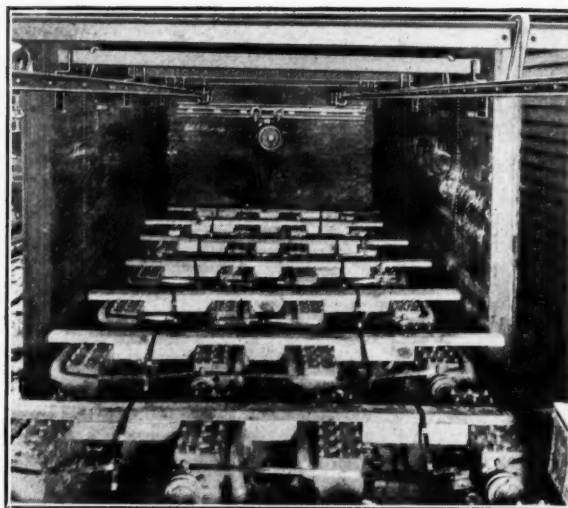
Monorail Box Car Loader

A MONORAIL device has been developed which permits goods brought to the shipping platform by monorail trolleys to be taken directly inside freight cars and unloaded at any point. This eliminates extra handling from the end of the monorail system to the final placement in the car and should materially speed up the car loading operation.

The box car loader, which is being made by The American Monorail Co., Cleveland, Ohio, can be assembled inside a freight car in about 15 min. by two men and can be dismantled and removed in less than 5 min. To prepare the car for the loader a number of steel brackets having offset bends at their upper ends and



American monorail box car loading crane latched in connection with loading platform monorail runway



Monorail box car loading system as used for loading engines at plant of Continental Motors Corp., Muskegon, Mich.

slotted holes at their lower ends are nailed along the sides of the interior of the car.

These brackets provide supports for a number of transverse stringers which, in turn, support the hangers carrying the runway rails upon which the crane bridge operates. The loader itself consists of a short transfer crane assembly operating on these two parallel runways which extend the full length of the car. The standard equipment is adjustable for cars from 36 to 40 ft. in length and for various widths. It has a capacity of 4000 lb.

In operation the car is spotted opposite the projecting end of the plant monorail system, the crane bridge is moved to the car door and aligned and latched into place with the monorail. The loaded trolley is then run onto the crane bridge, the latch released and the loaded bridge moved to the desired part of the car where the transverse motion of the hoist along the bridge permits the load to be placed in any location.

Ditzler Color Selection

WITH the very wide range of colors which are now available for automobile use, the task of selecting proper combinations has become increasingly difficult. The Ditzler Color Co. has recently developed a new method of displaying color combinations in their proper relationships which appears to be so excellent a solution of the problem that a patent has been applied for covering the method.

Miniature door panels, built to exact scale, and about 18 in. wide by 2 ft. high, are cast of aluminum and finished in various color combinations.

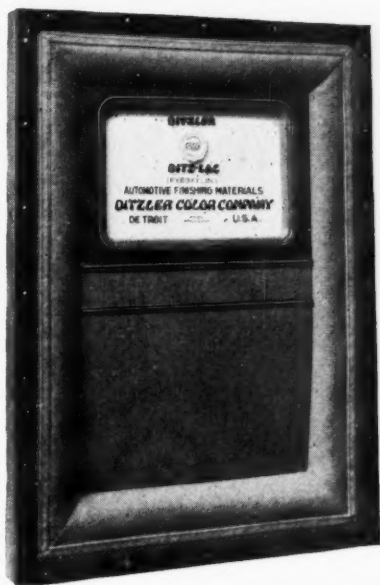
With a single door panel of the size mentioned the moldings stand out properly, the window reveals are quite evident and a very good idea can be obtained from them of how the entire body will appear when finished in the combination selected.

In addition to exterior colors, the present trend is to finish the interior of cars in fabrics whose patterns and colors are in harmony with the car exterior. To facilitate evaluation of this property the Ditzler company has

Parts, Accessories and Production Tools

provided a frame which can be covered with samples of various types, patterns and colors of upholstering materials. These frames are so made that the sample panels can be placed in them thus giving a direct comparison between the appearance of the two types of finishing material.

At present this method has been employed only for samples used in helping automobile manufacturers to select color schemes for their products. In the future it is hoped that it will be possible to decrease the cost of these samples to an extent which will permit them to be provided for dealers handling cars for which optional color combinations are offered so that prospective buyers can see just how the various colors appear in combination on an automobile body.



Miniature door panel used to display Ditzler color combinations

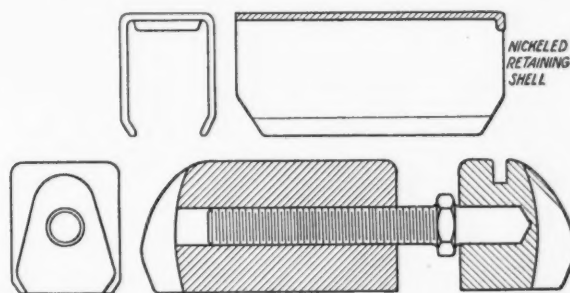
Flanigan Bus Brake

THE photographs reproduced herewith show a rear wheel brake specially designed for use on buses by E. B. Flanigan, Inc., of Wilkes-Barre, Pa. The brake is 18 in. in diameter by 5 in. wide, and owing to the special design of the mechanism it covers 300 deg. of the drum circumference. The brake is intended for application by a vacuum booster, and the large area of contact permits of the use of fabric lining. No adjustment except on the brake rods is necessary. It is claimed that the

pressure between brake shoes and drum is equally distributed and that, in consequence, wear is uniform. The whole brake assembly can be withdrawn after removing a single cotter pin. The two shoes are interchangeable.

Counterweights for Wire Wheels

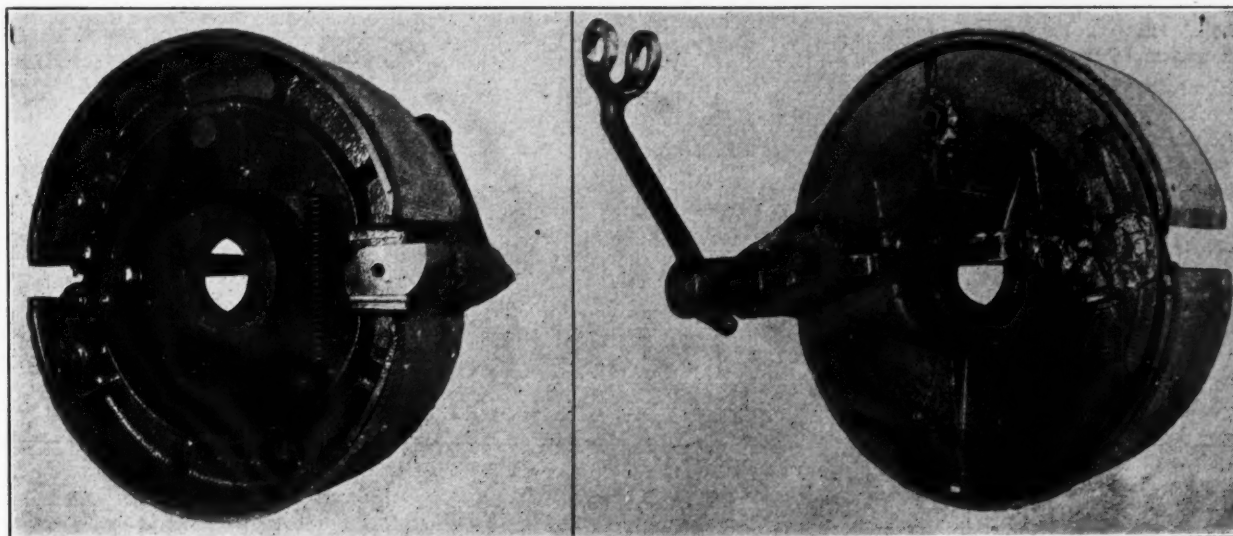
COUNTERWEIGHTS to balance the tire valves on wire wheels are being supplied by the Wire Wheel Corp. of America, Buffalo, N. Y. The weights are made of steel, in two parts, which can be moved closer together or farther apart by means of an adequate screw that screws into one and is guided in the other part. Thus the two parts can be adjusted so the assembly fits tightly between adjacent spokes at the rim. The nipple



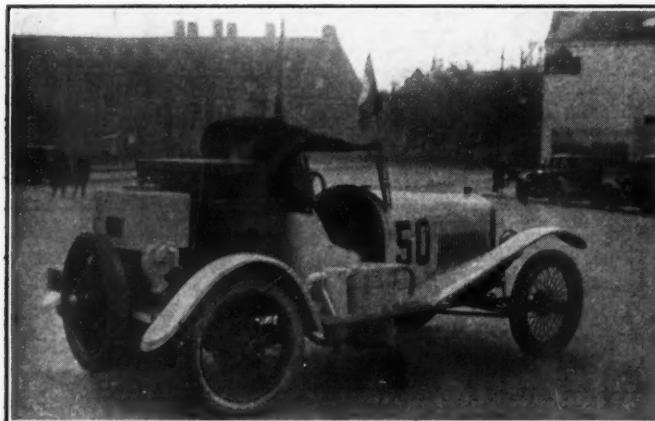
Wire wheel counterweight in section

wrench that is sent out with the wire wheels of the Wire Wheel Corp. of America can be used to adjust the balance weight. Before the balance weight is placed in position, the nickeled cover is removed, and the balance weight is then adjusted so the ends of the spokes lie in the grooves at the ends of the weight. The cover plate is then put on to give a good finish.

These counterweights are made in four sizes for wire wheels, viz., 3½, 5, 6½ and 7½ oz., and in one size of 12½ oz. for wood wheels. The weights can be varied by placing washers on the threaded screw.



Flanigan bus brake viewed from opposite sides



A Ford equipped to consume peat charcoal. The trunks at the rear contain reserve supplies of fuel for long-distance runs



A Panhard & Levassor seven-passenger coach carrying members of the Technical Commission. Knight engine runs on charcoal gas

Charcoal Gas *Used* Successfully in French Passenger Cars

Vehicles of all types make 18-day demonstration run as part of national program in favor of gasoline substitutes.

By W. F. Bradley

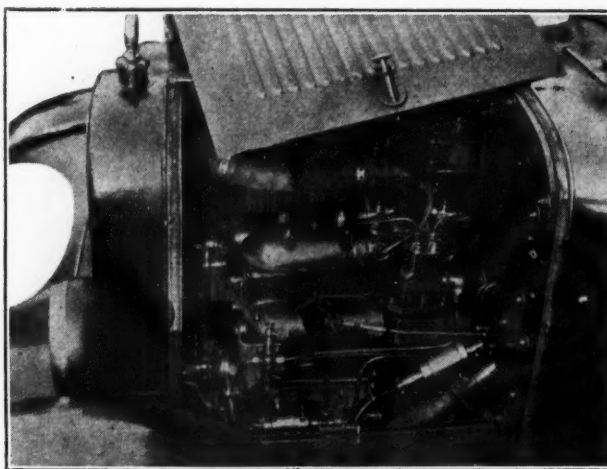
THIRTY automobiles, comprising trucks and passenger cars, recently took part in an 18-day demonstration 'round France during which they covered 2000 miles on French substitutes for gasoline. The initiative was taken by the Automobile Club of France with Government support, to show what has been done during the past few years to obtain independence from foreign supplies of gasoline and to develop a national program in favor of home-produced fuels capable of being used in existing automobile engines.

Producer gas plants consuming wood, wood charcoal or peat charcoal were found on 17 of the vehicles; compressed gases were used on four cars, liquid fuel on eight and there was one vehicle with a Diesel type two-cylinder, two-stroke heavy oil engine.

Greatest progress has been made in the application of wood and charcoal gas producing plants. With an increased compression ratio, bigger gas passages, a slight increase in piston displacement and greater attention to oil purifying, the results are equal to gasoline, with 50 per cent reduction in operating costs. Charcoal

gas is now perfectly pure, some of the tests indeed showing less deposit than with gasoline.

Even on small coaches the gas plant can be fitted with practically no loss of passenger capacity. Panhard & Levassor furnished a seven-passenger coach for carrying the members of the Technical Commission, with a producer plant neatly mounted to left and right of the driver. Renault ran a six-passenger open car with the generator across the rear, and Berliet had a sedan with the Imbert gas producer at the rear. Among the big trucks was a pneumatic tired 7-ton Liberty truck and a Panhard & Levassor carrying a compressor plant and compressed gas bottles, with a total weight of more than 9 tons.



The Held two-cylinder, two-stroke Diesel type engine in Citroen chassis

By the use of a new type of electro-fretted steel bottle, compressed coal gas has been made a practical proposition. These bottles weigh 10 lb. compared with 22 to 24 lb. for the ordinary steel bottles of one cubic meter capacity (atmospheric pressure) and consequently double the radius of action for a given weight and dimensions. Instead of using ordinary coal gas having

4500 calories per cubic meter, methane gas of 9000 calories is now employed. A Peugeot car operated with its supply of bottles on a light trailer; another Peugeot had the bottles within the body and the car was entirely conventional in appearance.

Alcohol figured largely among the liquid fuels, used either alone or with benzol or gasoline added, and sometimes with the adjunction of acetylene gas, which is

admitted in a gaseous state into the intake manifold ahead of the carburetor.

The only Diesel type engine in these trials was one built in Brussels by M. Held and fitted into a Citroen chassis. It is a twin-cylinder vertical two-stroke having direction injection and hot bulb ignition, electricity being used only for heating the bulb for starting. The engine made use of gas oil.

Indiana Builds New High-Speed, 3-Ton Truck

A THREE-TON, six-cylinder, high-speed truck is the latest development of the Indiana Truck Corp., Marion, Ind. This new job is powered with a valve-in-head motor with 4 in. bore and 5 in. stroke. Lubrication is full force feed from a gear type pump. Water circulation is obtained by means of a centrifugal pump which, in connection with a fin and tube type radiator with removable core and a 4-blade 20-in. diameter fan, assures ample cooling.

A plain tube carburetor is used with a hot spot on the manifold. The clutch is of the dry plate type in which Raybestos opposes steel. The transmission is mounted in unit with the engine and provides four speeds forward and one reverse. Reductions range from 5.35 to 1 on first speed to direct drive on fourth speed. Reverse reduction is 6.3 to 1. The propeller shaft is tubular and is fitted with three universal joints of the metallic type.

A semi-floating spiral, bevel rear axle is employed in which the axle shaft is carried on double taper roller bearings, the differential mounted on taper roller bearings and the pinion shaft on ball bearings. The front axle is of I-beam section, heat treated carbon steel with chrome nickel steel spindles. Steering thrust is taken by ball bearings on top of the steering knuckle.

Double internal brakes are fitted to the rear wheels. The bands are 2½ in. wide while the drums are 17 in. in diameter. A cam and lever type steering gear operated through a 20 in. wheel provides easy steering qualities.

The pressed steel channel section frame is 7 in. deep with 3 in. flanges made from 5/16 in. stock and does not require truss rods or reinforcements. Frame length back of seat is 180 in. and its width 33 in.

Springs are of silica manganese steel. Front springs are 40 in. long, 2½ in. wide and composed of 10 leaves; at the rear they are 50 in. long, 3 in. wide and contain

15 leaves. All spring eyes are bronze bushed permitting replacement in case of wear.

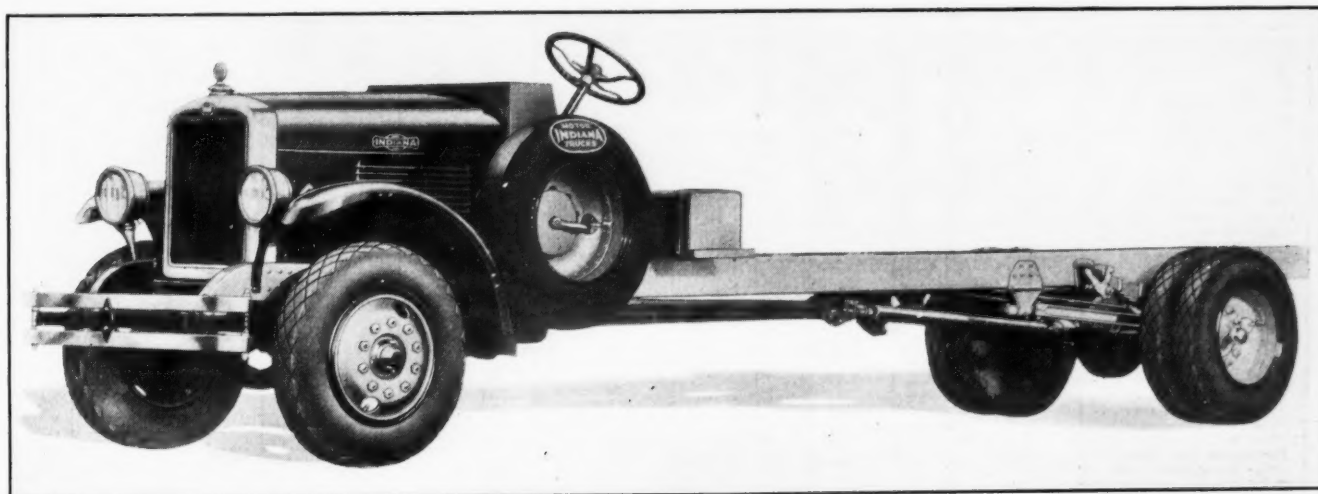
Budd disk steel wheels are fitted front and rear and take 344 by 7 in. cord tires front and dual cords at the rear. Standard gear ratio is 7 to 1, permitting a speed of 35 m.p.h. Standard wheelbase is 216½ in.; tread is 58 in. front and 62 in. at rear to center line between dual tires. Turning radius is 40 ft.

Standard equipment includes Moto Meter, crown front fenders, electric lighting and starting equipment, air cleaner, stop and spot lights, speedometer, two spare wheels and two-bar spring bumper.

A NEW Lo-Hed electric hoist which can be mounted in a fixed position, either overhead or on the ground, or can be placed on skids and used as a portable hoist, has been developed by the American Engineering Co., Philadelphia, Pa. The standard machine consists of a smooth drum, driven by a fully inclosed, ball-bearing motor through a chain of gears all mounted on a common bed plate. It is furnished in sizes for handling loads from 500 to 4500 lb.

Gears are of drop-forged steel, heat treated, and they run in an oil bath. Hyatt roller bearings are mounted on the ends of all gear shafts. The drum has large flanges to prevent the rope from jumping the ends and to give maximum stowage capacity. One bearing of the drum shaft is splash lubricated from the gears and the other end is provided with an Alemite fitting.

Either AC or DC motor can be furnished. The controller is of the single speed, reversing type. When desired, various modifications in the hoist can be made, such as supply grooved drums, air motors or steam motors, push button control, holding and lowering brakes, extension shafts with removable heads, etc.



New Indiana Model 628 three-ton speed truck

U. S. Exports of Cars, Trucks, Tires and Parts

COUNTRIES	GASOLINE PASSENGER CARS										TRUCKS					
	Up to \$500		\$500 to \$800		\$800 to \$1200		\$1200 to \$2000		Over \$2000		Up to 1 ton		1 to 2½ Tons		Over 2½ Tons	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Austria.....	2	\$1,074	5	\$3,300	1	\$894	2	\$2,766	3	\$6,603	6	\$2,137				
Azores and Madeira Islands	1	354	10	6,503	2	1,960										
Belgium.....	148	66,993	99	63,055	132	131,381	52	72,913	14	36,042	194	86,214	2	\$2,854		
Bulgaria.....											1	303				
Czecho-Slovakia.....					6	6,483			1	2,500						
Denmark and Faroe Islands.....	575	290,612	184	132,713	129	120,166	92	104,958	1	3,050	864	358,428				
Estonia.....					3	2,348										
Finland.....	6	2,628	74	47,110	86	88,221	49	65,466	9	20,642	13	12,376	23	31,599		
France.....	10	7,050	33	37,780	33	37,780	7	8,262	12	26,375	6	2,769				
Germany.....	21	11,227	35	25,202	183	179,250	44	61,953	51	128,191	5	3,662	1	1,025		
Greece.....	64	22,880			6	4,812	2	2,076	4	11,055	45	14,596	2	2,583		
Hungary.....			5	3,018	4	3,986	4	5,729								
Iceland.....																
Italy.....	91	26,660			1	868	3	3,753			50	12,980	3	3,227		
Latvia.....			1	879	10	7,887										
Lithuania.....																
Malta, Gozo and Cyprus.....			1	835	1	1,206										
Netherlands.....			29	17,121	63	56,900	24	33,212	13	38,011	4	5,129	6	6,002		
Norway.....			29	20,549	10	11,171	18	30,177	1	2,754	5	3,985	10	14,599		
Poland and Danzig.....					11	10,188	4	5,222								
Portugal.....	34	15,645	34	19,506	27	24,343	6	8,529	2	5,000	44	23,476	6	5,077		
Rumania.....	73	28,022	27	19,379	27	26,012	13	16,475	3	6,348	64	19,392				
Russia.....					4	2,984					31	11,594				
Spain.....	13	4,899	108	68,903	119	112,885	133	170,429	29	80,206	244	103,032	36	40,999		
Sweden.....	10	5,370	51	33,539	127	115,709	44	54,116	5	13,958	8	5,603	13	17,836		
Switzerland.....			15	9,700	26	26,978	16	24,187	7	17,805						
Turkey.....			4	2,730	7	5,655					1	1,067	3	4,171		
United Kingdom.....	59	27,841	612	371,102	227	209,960	49	63,612	41	107,437	388	186,879	1	1,407	5	4,800
Irish Free State.....							1	1,005					2	2,234		
Yugoslavia.....	6	2,822	6	4,368	8	7,676	3	3,200	2	4,843						
United States.....																
British Honduras.....	1	349														
Canada.....	127	40,383	881	527,425	427	423,858	180	242,618	74	190,680	44	29,323	102	133,747	37	209,826
Costa Rica.....	5	2,280	8	5,966	4	3,392			1	2,614	3	1,809	1	1,852		
Guatemala.....	1	150	3	2,245	12	12,734	8	9,909	4	9,892	4	2,971				
Honduras.....	11	3,525			4	4,059					4	1,434				
Nicaragua.....			1	723	6	5,068					3	1,366			1	5,400
Panama.....	3	1,248	9	6,171	11	11,899	4	5,131	1	1,689	11	6,121	3	5,466		
Salvador.....	1	338	3	1,924	18	15,261	2	3,744	5	11,788	5	2,949	5	19,887		
Mexico.....	282	108,261	90	58,406	124	112,704	30	42,487	14	37,876	204	98,921	65	92,498	9	18,066
Newfoundland.....	1	418	3	1,809	1	901										
Barbados.....			1	723	3	3,292										
Jamaica.....	14	5,700	13	9,161	15	14,860	3	3,527			1	775			2	4,263
Trinidad.....	3	1,550			2	1,522							1	1,472		
Other British West Indies.....	7	1,829			4	3,926	1	1,500			1	303				
Cuba.....	174	63,190	197	109,886	55	56,539	20	26,217	22	60,203	98	32,734	22	23,946	2	5,192
Dominican Republic.....	3	1,062	6	3,783	1	992	1	1,124			1	303			1	4,348
Dutch West Indies.....	3	1,208	2	1,472	9	8,911	5	5,887			2	645			1	2,620
French West Indies.....	5	1,835									2	756				
Haiti.....	2	786	4	2,892	8	6,746					2	865				
Virgin Islands.....	3	990														
Argentina.....	1,527	639,072	582	343,828	353	315,474	162	192,581	66	148,206	598	228,284	51	96,580	32	89,863
Bolivia.....					4	4,578			6	16,250						
Brazil.....	662	248,393	189	125,789	256	200,805	111	129,248	21	47,934	1,032	391,207	37	41,977	1	2,190
Chile.....	99	25,272	24	15,488	49	42,716	9	10,027	4	9,595	21	9,276	15	24,602		
Colombia.....	40	15,503	30	23,212	37	35,503	18	26,330	15	43,236	34	19,424	53	85,155	20	50,152
Ecuador.....	8	2,976									6	2,055				
British Guiana.....													2	2,285		
French Guiana.....																
Dutch Guiana.....																
Paraguay.....	3	1,062			1	960					6	1,821				
Peru.....	25	9,759	13	8,660	18	15,494	4	5,977			24	11,101	22	27,736		
Uruguay.....	220	96,786	54	31,738	50	50,273	15	21,646	10	26,459	54	14,954	9	28,585	4	21,261
Venezuela.....	73	23,749	32	23,243	56	51,262	25	32,257	10	25,980	28	15,526	17	22,190	3	9,026
Aden.....	13	6,985	1	631												
British India.....	2	950	108	64,449	153	129,501			1	1,931	186	93,729	9	8,929	1	5,900
Ceylon.....			10	5,043	29	25,112	2	3,135			13	7,754	16	16,194		
Strait Settlements.....	2	1,062	19	12,383	18	16,204	2	2,261	3	7,731	2	1,818	2	2,492	2	5,460
China.....	33	11,789	48	31,833	21	19,680	2	2,739	2	5,974	95	34,174	2	4,495		
Java and Madura.....	293	139,158	98	71,597	23	21,152	15	19,654	3	6,502	158	120,420				
Other Dutch East Indies.....			8	5,194	8	8,355			1	2,245						
French Indo-China.....											10	3,015				
Hejaz, Arabia and Iraq.....	53	23,514			5	4,658	2	3,154			47	17,092	2	1,437		
Hongkong.....	39	13,800			4	3,404	2	3,143			30	9,090				
Japan.....	16	5,721	54	35,291	91	93,367	8	11,627	12	34,842			49	87,287		
Kwantung.....			15	9,846	3	2,930					1	918				
Palestine and Syria.....			4	2,501	10	9,342	3	3,901			8	4,262	2	2,741	3	31,000
Persia.....			1	642	1	747					12	5,221				
Philippine Islands.....	105	49,864	28	17,515	106	103,607	23	31,217	2	4,703	101	33,040	98	51,607		
Siam.....			10	7,474												
Turkey.....	32	12,633									6	1,918				
Australia.....	1,195	563,507	2,238	1,441,155	963	910,726	320	439,520	92	223,161	3,763	1,941,324	216	278,185	17	52,646
New Zealand.....	39	15,523	78	56,004	126	113,275	27	33,549	3	5,972	54	18,737	13	23,109	1	2,768
British Oceania.....	12	5,313	1	723	15	12,796	2	2,547			4	1,846				
French Oceania.....					1	950			1	2,500						
Other Oceania.....																
Belgian Congo.....			7	4,463			2	2,850			19	17,312	35	41,445		
British West Africa.....			233	152,404	937	810,452	109	132,163	5	9,294	148	67,187	36	46,629		
British East Africa.....			31	18,303	28	24,741	1	1,147			32	19,383	10	12,028		
Canary Islands.....			2	1,354	6	6,127					1	756	1	1,030		
Egypt.....	249	85,340	85	41,021	20	18,475	18	21,971	1	3,310	80	27,003	1	724		
Algeria and Tunisia.....																
Other French Africa.....																
Italian Africa.....																
Liberia.....																
Madagascar.....	2	708					1	1,014			12	4,421	2	2,079		
Morocco.....	31	11,087	2	1,192	7	5,933	1	1,893			19	9,482				
Portuguese East Africa.....			8	6,150	13	9,990	2	2,280					2	2,397		
Other Portuguese Africa.....											1	959				
Spanish Africa.....					1	1,103					4	3,779	2	2,421		
Total.....	7,127	\$3,011,727	6,573													

Canadian Exports

ELECTRIC VEHICLES		PARTS	TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
No.	Value	Value	Casings		Inners		Solids		Up to \$500		\$500 to \$1000		Over \$1000		No.	Value	Value	
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	
	\$7,141 98,467	34 1,218	\$793 22,541			29 \$1,180	\$1,402 4											Austria Azores and Madeira Islands Belgium Bulgaria Czechoslovakia Denmark and Faroe Islands Esthonia Finland France German Greece Hungary Iceland Italy Latvia Lithuania Malta, Gozo and Cyprus Is. Netherlands Norway Poland and Danzig Portugal Rumania Russia Spain Sweden Switzerland Turkey United Kingdom Irish Free State Yugoslavia United States British Honduras Canada Costa Rica Guatemala Honduras Nicaragua Panama Salvador Mexico Newfoundland Barbados Jamaica Trinidad Other British West Indies Cuba Dominican Republic Dutch West Indies French West Indies Haiti Virgin Islands Argentina Bolivia Brazil Chile Colombia Ecuador British Guiana French Guiana Dutch Guiana Paraguay Peru Uruguay Venezuela Aden British India Ceylon Straits Settlements China Java and Madura Other Dutch East Indies French Indo China Hejaz, Arabia and Iraq Hongkong Japan Kwantung Palestine and Syria Persia Philippine Islands Siam Turkey Australia New Zealand British Oceania French Oceania Other Oceania Belgian Congo British West Africa British South Africa British East Africa Canary Islands Egypt Algeria and Tunis Other French Africa Italian Africa Liberia Madagascar Morocco Portuguese East Africa Other Portuguese Africa Spanish Africa
10	\$11,210	\$8,043,973	219,543	\$2,673,210	113,522	\$211,459	11,019	\$343,105	2,424	\$877,096	769	\$563,131	404	\$496,146	1,711	\$580,190	\$380,682	Total

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

Saturday, April 9, 1927

Factory Schedules Higher as Sales Continue Gains

PHILADELPHIA, April 9—The seasonal upward swing in automobile production and sales is continuing and although for the entire industry the level is still somewhat below that of the same period a year ago, some of the producers are making new records. The rather spotty condition revealed by reports on individual companies is not symptomatic of an unfavorable market but an indication of current competitive relations.

It is now generally believed that approximately the present price level will endure through the active selling season. Some companies later may make reductions to move cars in preparation for new models, but the most influential factories appear committed to the maintenance of prices which are already low in relation to manufacturing costs.

Dealer new car stocks are generally in good condition and, considering the state of the market, are by no means heavy. The same cannot be said of used cars except in territories where dealers have adhered to fairly sound policies in this department of the business. Now is the time of the year when used car inventories are usually lowered and on many lines this is being accomplished.

Truck production and sales have shown a consistently better record this year than passenger cars, for reasons that are not readily ascertainable. Exports of both cars and trucks are above last year's levels.

Zens Named Sales Head of Jordan Organization

CLEVELAND, April 6—Paul Zens, formerly secretary-treasurer of Jordan Motor Car Co., has been appointed vice-president in charge of sales. He was associated with Edward S. Jordan in the organization of the Jordan company in January, 1916.

W. B. Riley, formerly sales manager, has been named secretary of the company.

These organization changes have been announced following the annual meeting. Other officers are Edward S. Jordan, president; Charles L. Bradley, vice-president, and F. G. Tyler, treasurer.

Hardiman Heads Harrison

NEW YORK, April 6—F. M. Hardiman has been named president and general manager of the Harrison Radiator Corp., succeeding the late Herbert C. Harrison, who died recently. Mr. Hardiman has had many years' experience with the Harrison company, advancing through several posts until about a year and a half ago he was made acting general manager.

Ford 1926 Earnings Fixed at \$90,000,000

BOSTON, April 6—Earnings of approximately \$90,000,000 in 1926 by Ford Motor Co. were indicated by the annual balance sheet filed here with the Massachusetts Commissioner of Corporations. This compares with an approximate income of \$115,000,000 in 1925. Surplus account was increased to \$697,637,788, as of Dec. 31, 1926, from \$622,366,893 the year previous.

Inventories of the company were reduced from \$107,631,138 in 1925 to \$88,074,988, which is pointed to as indicating that the Ford company began reducing its parts stock in 1926 in preparation for a new model this year. That this inventory reduction has been carried much lower in the early months this year is generally accepted in the industry, so much so that the upbuilding of new stocks for the new car is now generally believed to be under way.

The cash position of the company was increased to \$443,709,361 from \$377,105,078. Real estate value showed an increase to \$143,293,982 from \$132,107,208, figures which are generally credited with being very conservative. Machinery and equipment showed an increase to \$137,615,082 from \$124,445,908. On the liability side of the ledger the outstanding change is a reduction in accounts payable to \$50,294,734 from \$76,633,613. Reserves are reduced to \$18,866,058 from \$26,503,562.

Ford earnings can only be computed by adding the increase in surplus to the estimated dividends drawn by members of the Ford family, who are the only stockholders. These dividends have to be estimated from the income tax returns filed by Mr. and Mrs. Henry Ford and Edsel Ford.

Pierce-Arrow Prices Down

BUFFALO, April 6—Pierce-Arrow Motor Car Co. has made reductions ranging from \$355 to \$500 on its series 80 models, the new prices being the lowest in the company's history and being effective immediately.

March Production Estimated 380,000

NEW YORK, April 6—March production of cars and trucks in the United States and Canada is estimated at approximately 380,000 against 317,316 in February and 448,491 in March of 1926. Further gains are expected in April but the total will probably still remain under a year ago, due to the comparatively slow rate of Ford operations.

S.A.E. May Divide Production Session

NEW YORK, April 5—The production advisory committee of the Society of Automotive Engineers will recommend to the meetings committee that the first two days' session of the annual production meeting, to be held the week of Sept. 19, be held in Cleveland and the last two days in Detroit.

If approved this arrangement will make it possible for members attending to visit the exhibition of the National Machine Tool Builders Association in Cleveland early in the week and the exhibition of the American Society for Steel Treating in Detroit later in the week. Members would be transported from Cleveland to Detroit by lake steamer over night.

New Peerless at \$1,295 to Increase 1927 Sales

CLEVELAND, April 6—Peerless Motor Car Corp. will soon announce a new car to sell at \$1,295 which will vastly increase its sales opportunity as well as its production schedule, according to a statement by Edward VerLinden, president, at the annual meeting this week. The outlook is exceedingly bright for 1927, he said.

The following were reelected as directors: W. R. Angell, R. M. Calfee, G. A. Coulton, L. R. German, C. H. Larson, H. C. Robinson, V. W. Sincere, C. E. Sullivan, H. A. Tremaine, F. A. Trester, C. H. Tucker, Edward VerLinden, and L. J. Wolf.

T. S. Sligh, Jr.

SOUTH BEND, April 6—Funeral services for T. S. Sligh, Jr., a member of the engineering staff of the Studebaker Corp., were held this week. Mr. Sligh was killed by the accidental discharge of a pistol. He joined Studebaker recently, formerly having been identified with the Bureau of Standards.

Durant Announces Formation of Consolidated Motors, Inc.

Corporation Will Have Star Six as Nucleus—Dealers to Share in Earnings on Stock—Creates Fund to Finance Star Sales at Low Rate

NEW YORK, April 7—W. C. Durant's announcement today served to allay to some extent the public's curiosity regarding his current plans to further his automotive interests but led to several points for interested discussion in the industry and trade. And to these questions Durant's executives were silent. Mr. Durant himself, as hitherto, would add nothing to his formal statement.

The announcement told of the formation of Consolidated Motors, Inc., which has for its object the bringing together of such independent motor companies as will be benefited by the arrangement. It is further set forth that the Star Six new models which are on display today, would be the nucleus around which Consolidated Motors, Inc., would be built, "exactly as Buick in 1908 was used as the nucleus and the keystone of the great General Motors Corp." No public sale of stock is contemplated.

Showing the greatest concern for the progress and prosperity of Star dealers, Mr. Durant lashed out at the "maliciously false statements" which he said have been circulated affecting the credit of the companies producing the Star car, the object being to discourage dealers from taking the line and to frighten prospective customers from purchases. He said: "I here and now pledge my entire personal fortune, guaranteeing not only the financial responsibility of these companies, but the stability of policies and the integrity of the management as well."

Absorbs Insurance Costs

With the same object in view, Mr. Durant described in general terms a financing plan which will no doubt provoke widespread discussion in the industry. He declares he has set aside a revolving sum for financing the sale of Star cars on what he calls approved acceptance contracts in which the purchaser is to be charged merely interest on the deferred payments at the rate of 6 per cent annually—"all other charges, including fire and theft insurance, to be borne by me."

He says further: "In the interest of Star dealers, my plan further contemplates setting aside for their benefit a considerable block of Durant Motors, Inc., stock purchased in the open market, the profits on this stock computed at the end of each year to be distributed to Star dealers based upon pre-arranged schedules and results obtained. There is to be no money investment or obligation on the part of

the dealer under this arrangement."

As evidence of his determination to make all other interests secondary to the automotive business, Mr. Durant announced his resignation from the directorates of a number of non-automotive concerns. His object in the whole program, he says, is that "the name Durant shall stand for something better than a football in Wall Street."

Consolidated Motors, Inc., was incorporated under the laws of Delaware, the application having been filed on March 29, at Dover by Prentice-Hall, Inc. The company's capital will consist of 1000 shares of no par common stock. In the financial district it was assumed that Mr. Durant had in mind the enlargement of the share capital as his plans progressed.

G.M. Buys Lovejoy Shock Absorber

DETROIT, April 2—Manufacturing rights to the Lovejoy Shock Absorber have been acquired by General Motors Corp., through the Delco-Remy Corp., one of its divisions. The shock absorbers will be manufactured at Dayton under the name Lovejoy for factory equipment only, for the present. Heavy production is anticipated to commence immediately, as several large contracts with leading car manufacturers have been closed.

George A. Crittenden, general sales manager of Lovejoy Mfg. Co., said this new arrangement will have no effect upon the current business of the company. Lovejoys are now being shipped as standard equipment on Rolls-Royce, Marmon 75, Little Marmon, Locomobile, Reo, Auburn, Elcar, Yellow Truck & Coach, Mack-International and American Car & Foundry models. Lovejoy also sells to the trade through more than 50 wholesale distributors.

Rose Heads La France

NEW YORK, April 6—J. R. Clark was elected chairman of the board of American-La France Fire Engine Co., and C. D. Rose was elected president and general manager to succeed Mr. Clark. Mr. Rose recently joined the company as vice-president. He formerly had been an officer of Velie Motor Co.

Builds 100,000th Pontiac

DETROIT, April 5—The 100,000th Pontiac was completed by the Oakland Motor Car Co., on March 28, less than 15 months after the first car was built.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co.

NEW YORK, April 7—Trade volumes increased further last week, seasonal factors such as milder weather and the approach of Easter being mentioned among the stimulating influences. General industrial and commercial activity, however, still appears to be lower than a year ago. The level of commodity prices was virtually unchanged last week, while stock quotations tended toward higher levels, reaching on Monday of this week, according to the New York Times average, the highest point on record.

FREIGHT CAR LOADINGS

The year's second million-car total of freight loadings is reported for the week ended March 19, when loadings numbered 1,006,861 cars, as against 1,005,715 cars in the preceding week and 977,018 cars in the corresponding period last year.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended March 30 were 3.9 per cent smaller than the total for the preceding week and 1.7 per cent below that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 140.3 last week, as against 140.4 a week earlier and 142.1 four weeks earlier. Dun's and Bradstreet's indexes reflect fractional declines during March.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks increased 16,400,000 during the week ended March 30, with a decline of \$1,100,000 in discounts more than offset by gains of \$6,200,000 in open market purchases and \$10,900,000 in holdings of Government securities. Note circulation increased \$9,700,000, while deposits decreased \$1,800,000 and reserves \$10,600,000. The reserve ratio declined from 79.2 to 78.8 per cent.

During the same period, loans of reporting member banks declined \$3,000,000, a drop of \$12,000,000 in loans secured by stocks and bonds more than offsetting gains of \$1,000,000 in loans secured by Government obligations and \$8,000,000 in "all other" loans. Investments decreased \$32,000,000, borrowing from the Federal Reserve banks \$13,000,000 and net demand deposits \$57,000,000.

The call loan rate again ranged from 4 to 4½ per cent last week, while time loan and commercial paper rates remained at 4% to 4½ per cent and 4 to 4¼ per cent respectively.

Moon Adds 2 Models

ST. LOUIS, April 5—A new royal roadster at \$1,195 and a new royal cabriolet roadster at \$1,295 have been added by Moon Motor Car Co. to its 6-60 line. Both new models are of three to five-passenger capacity.

New French Tariff Hits Small Cars

New Specific Duties Equivalent to 125 Per Cent Import
—Parts on Same Basis

PARIS, March 22 (by mail)—A fatal blow will be struck at the importation of cheap American automobiles if the French tariff bill, expected to come up for discussion in the Chamber very shortly, is passed without amendment. This bill provides for the continuance of the present 45 per cent ad valorem duty or for specific duties based on weight, the higher of the two being applied.

Officials of Ford Motor Co. here state that the new specific duties which apply both to complete cars and to parts, will be equivalent to an imposition of 125 per cent. One of the leading American concerns states that the duty on its varied models will vary from 90 to 138 per cent of their value. Studebaker states that there will be little or no change on the big models, but the Erskine will pay 4000 francs increased duty. The duty on the Packard Six will go up; on the eight-cylinder model it will go down slightly. Careful examination of the proposed law shows that the tariff will be prohibitive on cheap cars, but will make little change on high class and costly models.

Badly as automobiles are hit, the tariff is still higher on electrical parts. Half a dozen importers of American electrical equipment met in Paris this week to discuss the effects of the tariff and to devise a plan of action, when the statement was made that the specific duties on certain electrical parts were equal to 1200 per cent their American selling price. On automobile tires the duty will be roughly 50 per cent.

Automobile parts are assessed on the same basis as complete cars, thus making it impossible to get any relief by bringing in parts for assembly. The tariff devotes four pages to automobile parts only and includes 50 different items. It should be noted that America gets the benefit of the minimum tariff, the general tariff being three times higher than the figures quoted above.

So adversely are all American goods affected by the new tariff act that the American Chamber of Commerce in Paris is taking action to bring representations before the French government. The tariff commission states that it is willing to listen to the observations of importers, but there is a danger that the bill will be rushed through before Easter without discussion.

Germans Oppose Gas Tax

WASHINGTON, April 2—Efforts to introduce a gasoline tax in Germany to replace the present arbitrary horse-

Japan Widens Streets to Permit Car Use

WASHINGTON, April 6—The automobile gradually is replacing the jinrikisha in Japan, according to consular advices received by the U. S. Department of Commerce this week. In the Nagasaki district an extensive program of street and road building has been launched. Main cities are undertaking programs of street widening.

Motor buses and taxicabs are becoming increasingly popular, especially in the Prefecture of Saga, where fully 90 per cent of all motor vehicles are of these types.

power tax have met with heavy opposition from farmers and fuel producers and certain commercial interests, the U. S. Department of Commerce was notified this week. This opposition has definitely killed for the present any chance for enactment of the gasoline taxation law.

Truck Exports Show 72.2 Per Cent Gain

WASHINGTON, April 6—Shipments of American motor trucks to foreign markets in February established a new high record, with 10,120 units, or a gain of 72.2 per cent over February, 1926, it was announced here this week by the U. S. Department of Commerce. Passenger car exportations decreased.

The total February production of trucks in this country amounted to only 38,029, the exports registering 26.6 per cent of the output. The value of the truck exports was \$32,265,148, an increase of 7.2 per cent over February, 1926, when the value was \$30,103,506.

Production of passenger cars in February totaled 260,330, as compared with 319,763 in February of last year. Passenger car exports numbered 21,355 in February this year and 22,355 in February, 1926.

Canada Tire Exports Gain

WASHINGTON, April 5—Canadian exports of automobile tire casings increased from 124,722 in January to 175,702 in February, it was announced here this week by the rubber division of the U. S. Department of Commerce. The average declared value per casing was \$10.20 in February and \$10.40 in January.

Star 6 Adds Cabriolet

NEW YORK, April 3—Durant Motors, Inc., has added a four-passenger cabriolet model on the Star six chassis, priced at \$915. Equipment includes front and rear bumpers and shock absorbers.

Mine Owners Back French Fuel Plan

New Company Will Make
Synthetic Gasoline From
Coal and Other Products

PARIS, March 22 (by mail)—A powerful company interested in the production of synthetic gasoline from coal has been formed under the title Carburants et Produits de Synthèse, with a capital of 5,000,000 francs which may be increased to 25,000,000 by decision of the board. The stockholders comprise practically the whole of the mine owners in the North and the Pas-de-Calais, and the companies at Blanzey, Sarre, Moselle, Petite Rosselle, Carmaux, and Bouches du Rhone. The total production of these various companies represents more than 37,000,000 tons.

The new company has been formed for the chemical treatment of such combustibles as coal and lignite and their solid, liquid or gaseous derivatives, with a view to the production of synthetic gasoline. The president of the company is M. Cuvelette, general manager of the Mines de Lens, while the list of members of the board includes the names of practically all the directors of the mines in the north of France.

Speaking at the initial gathering of the new company M. Cuvelette stated that there was no intention of creating a monopoly, for even if only one-quarter of the gasoline needs of France were met, the capital to be invested would probably be in the neighborhood of a milliard of francs; there was thus room for all. Opportunities would be given to other industrial groups to join in with them, on condition that they accepted terms.

Belgian Market Better

WASHINGTON, April 2—Automobile sales in Belgium are picking up rapidly and the outlook is brighter than during the past year, the U. S. Department of Commerce was advised this week. There was less competition from French makes but producers of light cars were reported financially pinched and selling below cost to secure cash. Recent tax changes have aided the competitive position of low priced American cars and the proposed elimination of luxury taxes on cars costing under 40,000 francs is expected to further increase the sales.

Forms French Tire Sales

NEW YORK, April 2—Pneumatics Americans is the title of a newly organized concern with offices at 56 rue Marius Auphan, Levallois-Perret, Seine, France. The company, which has a capital stock of 600,000 francs, fully paid, will sell in France the tires and other products of the Firestone Tire & Rubber Co.

Industry Continues Large Steel Demand

Price Structure Continues Firm
—Coal Strike Not Expected
to Affect Market

NEW YORK, April 7—Flow of steel products into automotive consumption continues at a relatively high rate. While signs of a slowing down in the demand from other industrial consumers are in evidence, especially so in sheets, typical automotive steel products, such as full-finished automobile sheets, continue to move in as heavy a volume as capacity of the producers permits. Strip-steel mills are also operating at capacity and automotive demand for both hot and cold-rolled is well maintained. This holds true of cold-finished steel bars, and automotive alloy steel manufacturers are operating at a fair rate as well.

The market's price structure on the whole remains intact. Deviations, rather few and far between, are in the nature of concessions, and no premiums are necessary to insure prompt shipment of material even when buyer's demands for accommodation border on the unreasonable.

So far the coal strike has not had the remotest effect on the steel market and leaders of the industry continue to express it as their firm conviction that it will not. Some admit, however, that it may be used as an argument to induce quickened buying.

For the present, upward market changes are out of the question. Production is running ahead of demand which is expected to taper off from now on. What the steel market is more concerned about just now than the immediate outlook is how soon after the seasonal midsummer decline in output and sales a fresh buying wave will make itself felt. It is in this connection that the coal strike's possible effect is chiefly considered.

Pig Iron—Automotive foundries appear to be fairly well provided, and are awaiting further developments regarding the effect of the coal strike on coke as well as pig iron before committing themselves further. The market is quiet with prices steady rather than strong.

Aluminum—Routine conditions are in evidence in all of the market's departments. Foundries are buying No. 12 alloy periodically rather than large quantities at one time. No spectacular change has taken place in the import situation. Prices are on an even keel all around.

Copper—A good demand for automotive brasses, etc., is indicated by fairly heavy takings of Lake Michigan copper by Detroit fabricators. Demand has somewhat improved in the New York market and prices slightly so.

Tin—Consumers show somewhat more interest, but continue cautious.

Lead—The market continues easy, with somewhat better demand from battery manufacturers anticipated.

Zinc—Only intermittent spells from the prevailing dullness are noted.

U. S. Action Stirs Rubber Activity

WASHINGTON, April 4—The rubber investigations conducted by the U. S. Department of Commerce have resulted in increased interest in foreign countries in rubber plantation development, it was announced here this week.

Reports from Brazil, Indo-China, the Netherlands, Indies, Burma, and Africa indicate far greater activity in the growing of commercial rubber. Railway and roadway extensions are being made in Burma to open 250,000 acres of new territory for rubber growing.

Refinery Number Lower but Capacity Increased

WASHINGTON, April 2—The total capacity of the petroleum refineries of the nation continues to increase, although the number of refineries was decreased during 1926.

On Jan. 1, 1927, there were 465 completed petroleum refineries in the United States, with a total daily crude oil capacity of 3,061,007 bbl. Seven refineries, with a potential capacity of 61,000 bbl. were in process of construction. Of the completed plants, 327, with a capacity of 2,834,282 bbl., or 93 per cent of the total, were in operation and 138 were shut down.

Compared with the figures a year before there was a net decrease of 45 in the number of completed refineries but an increase of 208,040 bbl. in total daily capacity.

J. W. Murray Will Filed

DETROIT, April 2—Real estate worth upwards of \$15,000 and personal property worth upwards of \$7,000 were listed in the estate of John W. Murray, chairman of the board of the J. W. Murray Mfg. Co., and a member of the executive committee of the Murray Corp. of America, when his will was filed in probate court yesterday. James R. Murray, a son, was appointed executor. By the terms of the will the estate will be placed in trust and whatever is needed of the income goes to the widow, Mrs. Harriet E. Murray. The remainder of the income is to be divided between the son and two daughters.

Robert Wilde

DETROIT, April 4—Funeral services for Robert Wilde, 56 years old, president of the Michigan Gear & Engineering Co., who died suddenly Thursday, were held Saturday. Mr. Wilde was born and educated in South Bend, and when 21 years old moved to Cleveland where he resided 10 years. In 1902 he came to Detroit and in 1917 organized the Michigan Gear & Engineering Co.

California to Study Enforced Insurance

Committee to Investigate Situation Before Legislation is Acted Upon

SACRAMENTO, CAL., April 4—Taking precedence over bills intended to impose compulsory automobile insurance, a concurrent resolution providing for a legislative committee to study the subject and report back to the Governor, has been adopted by the California State Legislature. The resolution provides for a committee consisting of Lieutenant-Governor Buron C. Fitts and two senators to be named by him to study compulsory automobile legislation, and report to Governor C. C. Young before the next session of the Legislature.

Dealers are divided on the subject, and the California State Automobile Association and the Automobile Club of Southern California have placed their legal and engineering departments at the orders of the committee for the investigation.

Plan Central Theft Bureau

SACRAMENTO, CAL., April 4—Making the traffic in stolen cars more difficult, the California Legislature has before it an amendment to the Motor Vehicle Act which provides for centralization of all automobile theft reports, immediately they are made to the police departments of all the cities of the state, in the office of the state division of motor vehicles.

The amendment provides that police departments, county sheriffs and other peace officers in receipt of a report of an automobile theft shall report such theft to the department of motor vehicles. If the car is not recovered within a week, a second report is made. From these reports, the department is to compile a weekly stolen-car record, against which engine and serial numbers are checked before transfer of registration, or new registration of any car will be permitted.

Buyers of used cars and used-car dealers will be better protected by this bill, which has the united support of members of the Legislature, while state and city authorities will be better able to apprehend car thieves. The measure is sponsored by the California State Automobile Association.

Overseas Club to Meet

NEW YORK, April 2—The Overseas Automotive Club has scheduled open luncheon meetings for April 14 and May 12 at the Hotel Empire. The first meeting will have as its principal speaker Herbert Langner, who will talk on problems in automotive trade marts abroad. At the second meeting F. W. Feiker, managing director of Associated Business Papers, will talk on advertising.

Hare & Chase Cuts Operations Zone

Will Confine Activities to
Northern Territory—N. S.
Hall Directs Policies

PHILADELPHIA, April 5—Under the new plan of operations of Hare & Chase, Inc., the company will confine its operations to the sector included in the triangle bordered by Boston, Chicago and Washington and the territory contiguous to those cities. Zone offices will be maintained in these three cities and in New York, Newark, Cleveland, Philadelphia and Detroit.

The company will operate under a system of centralized control with a large group of district offices operating under the zone offices. The company will continue more than half of its former district offices, thereby maintaining the local credit and collection service that it afforded in the past.

The company will extend a new dealer finance plan to all of its territory in the near future, the plan having been found highly successful in several cities in which it has been used. Important factors of safety are set up under the plan to overcome difficulties which have faced dealers and finance companies in the past.

New officers under the reorganization are C. E. Trinder, president, and N. S. Hall, vice-president. Mr. Trinder is a vice-president of the Royal Indemnity Co., which recently took over control of Hare & Chase. Mr. Hall formerly was president of the Mortgage & Acceptance Corp. and when that company was taken over by the Commercial Credit Co. he became vice-president of that company. With Hare & Chase Mr. Hall will act as general manager of company policies and operations.

Commercial Credit Adds to Reserve for Dealers

NEW YORK, April 5—Commercial Credit Co., Baltimore, has made changes in its repurchase agreement financing plan which include the setting up of larger reserves for the protection of dealers.

German Chrysler Formed

BERLIN, March 10 (*by mail*)—Chrysler Co. m.b.h. has been organized here with a capital stock of 200,000 marks as a subsidiary of the Chrysler Corp., the objects being the manufacture, assembly and sale of automobiles and parts.

Edge Buys AC Cars

LONDON, March 22 (*by mail*)—AC Cars, Ltd., manufacturer of the AC car, has been sold to S. F. Edge for £135,000 and will be operated in the future on a low production basis, with the factory assuming personal responsibility for service.

Mail Order House Drops Accessories

NEW YORK, April 4—With the completion of merger details of the National Cloak & Suit Co. and the Bellas Hess Co., announcement is made that the new company will discontinue the merchandising of heavy lines, including tires and automobile accessories, and will confine its activities to the handling of style merchandise.

Post Office Places Last Air Contract

WASHINGTON, April 4—National Air Transport, Inc., has been awarded the contract for the eastern section of the transcontinental air mail service between New York and Chicago. The company will carry the mails at \$1.24 a pound, 1 cent above the bid submitted by the North American Airways.

The latter company's bid was protested by Paul Henderson, former assistant postmaster general and now general manager of National Air Transport, Inc., because government air mail employees and a number of pilots were alleged to have agreed to subscribe to \$100,000 in stock of the North American Airways provided the company obtained the mail contract.

In making the award the Post Office Department stated:

"Considering all the attendant facts it was decided that the National Air Transport was the lowest and best responsible bidder and the contract was awarded on its bid of \$1.24 a pound. The transfer of the service will become effective July 1."

With the awarding of the New York-Chicago contract the Post Office Department has placed its entire air mail transportation system in the hands of private enterprises.

AC Markets Oil Filter

FLINT, April 4—The AC Spark Plug Co. has placed a complete AC oil filter installation on the market for application on cars not so equipped. The unit package, containing filter and fittings with complete instructions for installing, is adaptable for installation on various models of 29 makes of cars.

The package known as Assembly No. 1377 will be sold through AC jobbers.

Olds Uses Cadmium

DETROIT, April 4—Cadmium is now being used for plating all external bolts, nuts, washers and screws on Olds-mobile cars. Cadmium, a malleable white, ductile metal derived from greenockite, a comparatively rare mineral, is corrosion proof and being fairly soft does not crack when bolts or screws are tightened by hard, sharp tools.

Tire Volume Drops as Quarter Opens

Completion of Spring Dating
Orders Brings Respite Pending
Touring Season

AKRON, April 6—Preliminary reports from leading automobile tire manufacturers reveal that the first quarter of 1927 exceeded in volume of business any other first quarter in the history of the industry. Shipments of tires and tubes to dealers and car manufacturers not only have been abnormally heavy, but earnings of most tire companies were satisfactory. While the low selling price of tires has kept the margin of profit comparatively small, the big sales volume helped earnings substantially.

Officials of the Goodyear Tire & Rubber Co. report that the quarter just ended was the best period the company has ever experienced. Sales of the new balloon tire, introduced Jan. 10, reached the million mark before the first of April. Daily production at the company's three plants has been for some weeks at the high record of between 57,000 and 60,000 tires a day.

Miller Rubber Co. scored a 100 per cent increase in sales volume during the first quarter, according to F. C. Millhoff, general sales manager. Excellent gains in sales volume also are reported by Goodrich, Firestone, United States, Fisk, Ajax, General, and Seiberling.

Indications are that the total tire output for April will not be quite as large as that in the preceding month. Spring dating orders have been practically all filled, and there are signs of an easing off in replacement sales until the touring season opens. Shipments to car manufacturers, however, probably will be somewhat heavier.

With the abnormal tire demand, a gradually rising crude rubber market has existed for some weeks. The British rubber restriction act has already cut the exportable allowance to this country 30 per cent, with prospects of another cut of 10 per cent at the end of the present quarter May 1. This may foreshadow higher tire prices, in the opinion of some manufacturers.

This year is expected to see a production of 70,000,000 tires of all types as compared to slightly over 60,000,000 in 1926.

Buick Builds 1100 Daily

FLINT, April 2—Buick Motor Co. will maintain a production schedule of 1100 cars a day for April, which will be the largest April schedule in Buick's history. Production of 1927 models has now passed the 200,000 mark, the company being more than 20,000 cars ahead of the best previous record for this time of year. The present capacity of the plant is for 1200 cars daily.

Brake Safety Code Ready for Approval

Bureau of Standards Completes Plan for Standardizing Safety Requirements

WASHINGTON, April 5—The final draft of a proposed safety code for automobile brakes and brake testing, designed as a standard for enforcement by states, municipalities and local authorities, was made public here this week by H. H. Allen, of the U. S. Bureau of Standards. The code now requires only the ratification of the American Engineering Standards Committee to become the tentative standard for the nation and this ratification is expected within two weeks. The code was sponsored by the Bureau of Standards and the American Automobile Association.

The Bureau of Standards will calibrate testing equipment for state and municipal authorities and will referee methods of tests if necessary, in conformity with the code. The code would require all vehicles to be equipped with independently operated brakes (two means of operation), except as to electric trucks purchased prior to adoption of the code, and motorcycles.

Provision is made for electrical brakes. At least one hand brake is required capable at all times of restraining the vehicle. Automobiles weighing under 6000 lb. and passenger buses of any weight are required to have foot brakes capable of stopping the car within 50 ft. from a 20-mile speed. For vehicles above that weight two brakes must be provided, either of which would stop the machine within 75 ft. at a 20-mile speed and both of which in combination will stop it in 50 ft.

After ratification of the code complete information will be made available by the American Engineering Standards Committee.

Renews Test on Headlights

WASHINGTON, April 4—Prevailing disregard of automobile headlight regulations in the United States this week caused the U. S. Bureau of Standards to renew its tests and experiments with headlight illumination.

Two cars with four headlight lamps each are being used for the experiments at the bureau and 15 of the four-lamp equipments have been distributed by the Society of Automotive Engineers and the Society of Illuminating Engineers to automobile and headlight manufacturers for cooperative experiments.

After the tests a conference will be held this spring to permit an exchange of views and conclusions. The object sought is the combination of a safe, comfortable driving light from the standpoint of the driver with a minimum of inconvenience to the approaching driver. The tests so far show that

N.A.C.C. Survey Shows 2,700,000 Families Now in Two Cars per Family Class

NEW YORK, April 6—More than 2,700,000 families owning more than one car were found in the United States by the National Automobile Chamber of Commerce in its analysis of a survey by the General Federation of Women's Clubs and amplified by a further survey by the Chamber. On the average it was shown that 18 per cent of the car-owning families own more than one, and that 10 per cent of all the families in the country have more than one car. The method of learning the number of two-car families in the country was as follows:

Total motor car registrations	19,237,000
Owned by business houses	1,143,000
Private family motor cars	18,097,000
Number of families in United States	27,500,000
Percentage of families owning motor cars	55.7
Number of families owning motor cars	15,317,500
Number of cars remaining after allotting one automobile per family	2,779,500

The question arises as to whether the extra private motor cars are to be distributed to one more per family, or whether the three and four car ownership is usual. Since the three or four car element is not considered in the grand total it is estimated that this number of extra cars represents a total of more than one automobile. This is a big jump over 1920 when only 12 families out of every thousand motor owning families had more than one car.

accidents at night are more common from inadequate lights than from the so-called glare.

U. S. Automobile Imports Total 36 in February

WASHINGTON, April 5—The U. S. Department of Commerce this week began the publication each month of statistics showing imports of automotive products into the United States, to be used in connection with the regular export figures.

The figures for February, this year, show that 36 automobiles and chassis, with a value of \$62,672, were imported, as compared with 38 units and a value of \$97,706 in February, 1926; and that imports of bodies and parts, except tires, in February last were \$76,139, as compared with \$76,075 in February, 1926.

Moves Exposition Office

NEW YORK, April 4—The exposition office of the National Machine Tool Builders Association will be removed early this month to 225 West Thirty-fourth St., where larger quarters will be available. Detailed preparations for the association's national machine tool exposition are being made.

Chrysler on N.A.C.C. Board

NEW YORK, April 7—W. P. Chrysler, president of the Chrysler Corp., was elected a director of the National Automobile Chamber of Commerce at the directors' meeting this week, succeeding Col. Charles Clifton, who is now honorary president and an honorary director of the chamber.

N.A.C.C. Defines Open Shop Policy

NEW YORK, April 6—Taking a firm stand in favor of the open shop policy, members of the National Automobile Chamber of Commerce have adopted a resolution setting forth clearly what has always been the view of the industry on labor questions. The resolution is an answer to queries from the trade as to the industry's attitude. The text follows:

1. We hereby declare our approval of the open shop plan under which employment relations are established through voluntary exercise, the individual right of contract, and where every employee is required to work harmoniously with his fellow employees regardless of race, creed or trade union affiliation.
2. Since the employer is responsible for the work turned out he must have full discretion to select the men he considers competent and to determine the number of apprentices and helpers to be employed. It is the duty of the management to provide every opportunity for improvement and advancement to the individual workman, according to his ability.
3. Compensation may be hourly rate, premium or bonus system, piece work, flat rate or other equitable method best suited to obtain both the highest wages for the individual workman commensurate with his skill and efficiency and the best work at the lowest possible cost to the public.

Find Mystery Ads Delaying Business

Public Holding Back on Purchases Pending Announcements by Factories

COLUMBUS, OHIO, April 4—Columbus dealers and distributors report a slightly better business in March than prevailed in February, but sales are still about 20 to 25 per cent lower than March last year. While weather conditions were not the most favorable, still there was a considerable period of excellent weather, which stimulated trade in passenger cars to a certain extent.

The main factors, mitigating against a better trade have been the mystery advertisements of several concerns. The public has not been informed as to the future policies of several large manufacturing concerns and is holding off on purchases. When the expected announcements are made both dealers and distributors expect a good business.

The used car trade has likewise been slow and extra efforts have been put forth to dispose of rather large stocks of second-hand vehicles. Dealers however, are using a different method of valuing used cars and the problem of disposing of them is expected to be less serious. Commercial vehicles and especially truck business has been rather fair, although sales have not been up to the records of a year ago. The lighter types of delivery wagons are in largest demand.

Farmer business is slow in starting this spring, due largely to the inability of farmers to dispose of last year's crops. Late gathering has interfered with marketing conditions. But there is considerable interest shown in passenger cars in rural sections and a better trade is expected soon.

The demand for accessories is not very good, owing to the fact that most cars are now completely equipped when sold. Parts business has been better than any other feature of the automotive industry.

Better Weather Improves Conditions in Cincinnati

CINCINNATI, April 2—Disappointment in many quarters over business during December, January and February was relieved by a better March showing by nearly all motor car dealers in Cincinnati. Even with the increase in March, however, some few dealers reported the month was not up to expectations, but are not disheartened, attributing it solely to bad weather conditions.

All of the dealers feel confident that the next 90 days will bring the usual spring rush and are of the opinion that business through the fall season will bring the volume for 1927 up to that of last year.

Frank J. Santry, president of the Nash-Cincinnati Co., just returned from

Used Car Demand Keen in Orient

SAN FRANCISCO, April 4—Unusual demand for used cars to be resold in the Hawaiian and Philippine Islands, Japan and other sections of the Orient, was reported during March by used car dealers in San Francisco. According to one trader in used cars who came in from Manila late in the month, thoroughly rebuilt used cars can be transported to the Orient and sold at an excellent profit, including all charges for shipment. This dealer said that used cars are moving better than new cars.

a trip through his territory, declared dealers were moving more slowly than at any time in history, but he saw a general awakening and a determination to whip into it and make up during the next few months for the bad conditions existing since December.

Dealers, Mr. Santry said, find themselves today in a worse financial condition than for some time, due to too liberal trade-ins, with their stores and warehouses stocked with used cars.

Dealers to Make Money

"They have learned their lesson," said Mr. Santry, "and I look for the year to be as good as 1926 from a money standpoint, for the dealers are determined now to get a profit or keep their cars. Winter buying was slow, but spring is opening big and good weather is all we need now to give us a flying start."

Gardner Earnings Higher, Assets Ratio Now 5½ to 1

ST. LOUIS, April 4—Gardner Motor Co., Inc., earnings in March approximate 80 cents a share, with net earnings in the first quarter in excess of 50 cents a share. Net income for the first six months of the year is expected to reach \$225,000, this estimate being based on orders now on hand and the increasing volume of sales.

The balance sheet as of Dec. 31, 1926, shows a ratio of current assets to current liabilities of 5½ to 1 with no bank loans or indebtedness. Goodwill is carried at \$1.

Philadelphia Sales Gain

PHILADELPHIA, April 3—Sales of new cars at retail in the Philadelphia district showed an increase of 45.7 per cent in February over January and of 62.5 per cent over February, last year. Stocks of new cars were 14.8 per cent higher than in January owing to increased shipments. Used cars sales increased 72.2 per cent over January and 83.1 per cent over February, 1926, with an increase in stocks of 7.9 per cent over January and of 27 per cent over a year ago.

Science in Selling Needed, Says Glancy

Says Present Time Affords Dealers Opportunity to Establish Future

DETROIT, April 2—A. R. Glancy, president and general manager of Oakland Motor Car Co., back from an extended trip through the United States, sees a bright business outlook for the remainder of the year.

"I believe the present year presents a greater opportunity to automobile dealers than any other year in the history of the industry. They may not necessarily sell more cars, but they have the best opportunity ever presented to stabilize their business and to establish themselves securely for the future.

"In this connection I am preaching to them the doctrine of scientific merchandising. We have had plenty of science in the design and manufacture of automobiles. We still have need for more science in selling them.

"The automobile business has also reached what might be termed the 'service era.' Gradually it is developing the elements of greater courtesy and consideration toward car owners; better equipped service stations; efficient accounting systems and honesty in advertising."

With Mr. Glancy on his trip were W. B. Sawyer, eastern sales manager; E. M. Lubeck, western sales manager; W. M. Chamberlin, director of sales development; W. E. Fellows, director of advertising; R. A. Armstrong, director of service and Charles Morton, director of dealers' accounting.

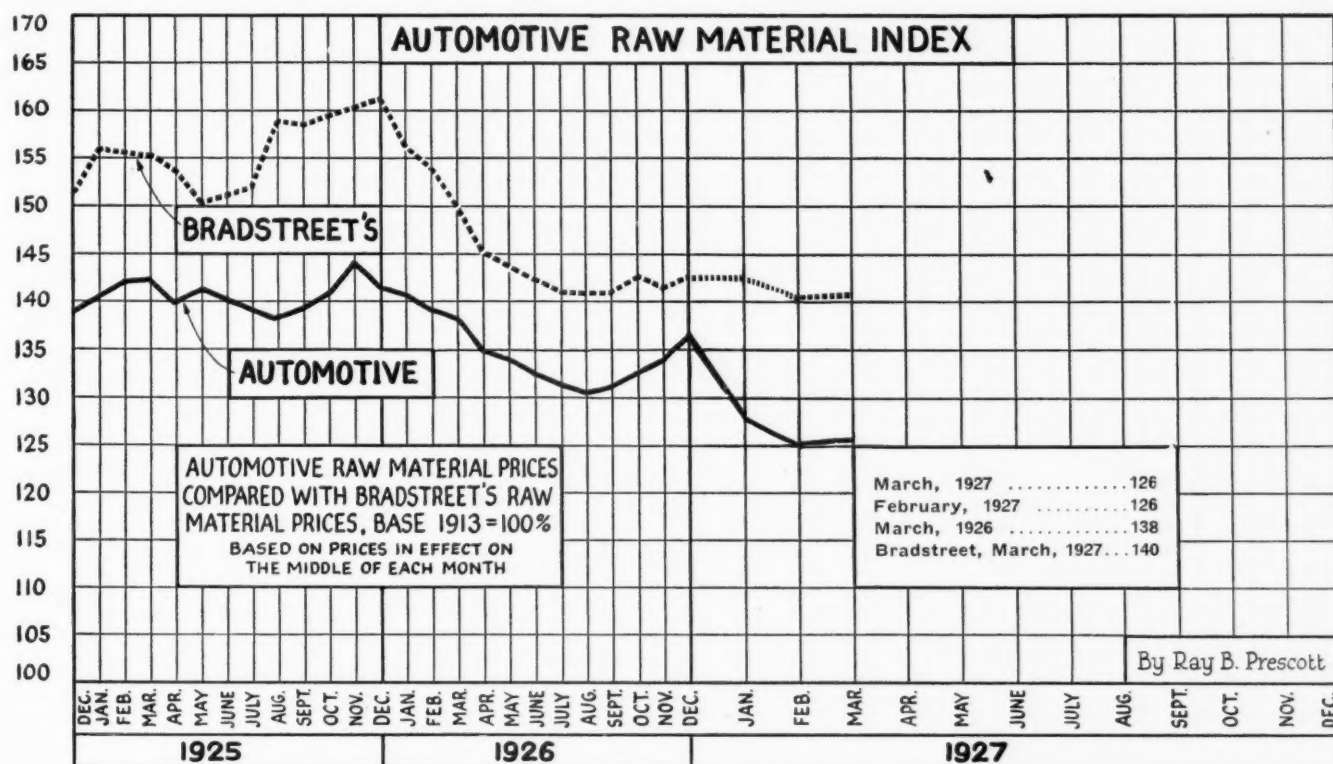
Kissel Adds Special Sedan

HARTFORD, WIS., April 2—Kissel Motor Car Co. has announced the addition of a special brougham sedan with 139 in. wheelbase to its "8-75" line. The new model lists from \$2,095 up, depending on the equipment desired. Kissel's standard eight-cylinder Model 65 has a wheelbase seven inches shorter than that of the new offering. Choice of two color combinations is offered in the special brougham sedan, one being Lenglen green with black wheels and the other green gray light with Winton green wheels.

Hudson Adds New Colors

DETROIT, April 1—Hudson Super-Six shipments of custom built seven-passenger sedan and five-passenger broughams are now coming through in new color combinations. Upper body on both models is black. Lower, on the sedan is blue and on the brougham Old Burgundy. Moldings of both models are black, blue and French gray striping being used on the sedans, and Castilian and Casino red on the brougham.

Raw Material Prices Hold Former Level



Hudson Continues Capacity Output

DETROIT, April 2—Hudson Motor Car Co. broke all records in its history when 37,000 cars were built and shipped in March. This same production rate will be maintained during April, it was stated this week, which is an average of 1500 cars a day.

Though Hudson has maintained a most aggressive pace in the early months of the year, the company is entering the spring season with practically no cars in the hands of dealers. Since January demand has been greater than the company could meet.

April will be the company's greatest export month, with orders for 4500 cars to be shipped overseas. Several of the important distributing points, including New York City, have already oversold their entire April allotments.

National Acme Names Board

CLEVELAND, April 2—After two adjournments the annual meeting of the National Acme Co. was held this week and resulted in the election of six of the old board and three new members. Directors elected are C. S. Eaton, F. H. Hobson, F. H. Chapin, A. B. Thompson, E. L. Geismer, A. W. Henn, A. D. Breeze, George E. Randles and A. E. Henn. A. D. Breeze, one of the new directors, is vice-president and general manager of the Cincinnati Ball Crank Co. George E. Randles is president of the Foote-Burt Co., and A. E. Henn, son of the late E. C. Henn, is manager of machinery sales.

President Fred H. Chapin said that

the election of new directors brought men to the board who have had years of manufacturing or sales experience and he feels they are bringing considerable value to the company.

Auto Body Co. Receiver to Move for Plant Sale

DETROIT, April 2—Only seven large stockholders of Auto Body Co., Lansing, appeared at a meeting called by the Central Trust Co., Lansing receivers, to discuss plans to rehabilitate the plant. Inasmuch as none of the stockholders present displayed interest in the plan, the receivers' next step probably will be to petition the court to set a sale date when bids on the various Auto Body Co. properties will be asked.

Inventories have been taken and some of the materials on hand have been sold. Appraisals of the property, both real and mechanical, have been made and these appraisals are now ready for submission to the court. Several inquiries have been received by the receiver relative to the property and its sale date, it is said.

Studebaker Signs Lease

NEW YORK, April 2—Paul G. Hoffman, vice-president of the Studebaker Corp. of America, has signed a permanent lease with Park Commissioner Gallatin of New York for the southeast corner of East Fordham Road and Belmont Avenue. The property was designed and equipped for automobile salesrooms and offices and is now occupied by the Packard Motor Car Co., which is preparing to move to its new Bronx home nearby on Fordham Road.

Reo April Schedule Doubles Past Mark

DETROIT, April 2—Reo Motor Car Co. plans to build 200 passenger cars and 75 commercial vehicles daily during April. This schedule is 60 per cent greater than for any other month in Reo's history. The figure calls for twice as many passenger cars as the company ever built and four times as many as were turned out in April, 1925.

Reo shipments for March aggregated 4395 units of which 1613 were commercial vehicles, which is double the business of March, 1925. While March was the second largest month in Reo's history, less than half of the March orders on the company's books were filled, and the company now has orders for 10,000 cars in April.

Hupp Sets Shipping Marks

DETROIT, April 4—Shipments by Hupp Motor Car Corp. in March totaled 4959 as compared with 4732 in March, 1926, and with February shipments of 4106. During the last week of March the company established two records—a single day's shipping of 392 cars and a week's shipping of 1453 cars.

Willys Shows Quarter Gain

TOLEDO, April 4—First quarter production of Willys-Overland Co. reached 56,564, an increase of 11,264 over the same period last year. March output was 40 per cent higher than for the same month last year, sales in all car types being increased.

Men of the Industry and What They Are Doing

E. M.-P. Murphy Elected Kelly-Springfield Head

Edward M.-P. Murphy was elected president of the Kelly-Springfield Truck & Bus Corp. of Springfield, Ohio, at a directors meeting in New York. Murphy, who is president of Edward M.-P. Murphy, Inc., specialist in the management of industrial enterprises, succeeds H. E. Zimmerman, president of the Selden Truck Corp., as head of the Kelly company.

Comprehensive plans for future operations are being prepared by the new management. V. D. Inman, vice-president of the Murphy company, has been named vice-president and general manager of the Kelly company and will take up his residence in Springfield shortly. F. L. McCarty, another vice-president of the Murphy company, is assisting in the reorganization.

Arms Joins Sleeper-Hartley

Clarence Arms will join Sleeper & Hartley, Inc., as manager of the continuous wire drawing machinery department, resigning as president and general manager of the Wheeldon Wire Co. to take over this new work. Mr. Arms is widely known in his field, having served for 10 years with J. A. Roebeling's Sons Co. and later with the Wickwire Spencer Steel Corp.

Bibbins at Traffic Meeting

J. Rowland Bibbins, special traffic consultant to Detroit, Providence and other cities, has been added to the speakers on the program of the City Traffic Conference scheduled by the National Automobile Chamber of Commerce for April 13 and 14 in Chicago. He will talk on "Coordination of Transportation Facilities."

Sherbino Joins U. S. Asbestos

M. R. Sherbino has resigned as research engineer of the Hydraulic Brake Co. and has been appointed chief engineer of the automotive division of the United States Asbestos Co. with offices in the Basso Building, Detroit. In his new work Mr. Sherbino will introduce to the industry the brake lining product of the asbestos company.

Rumney Heads Railway

Mason P. Rumney, vice-president of Detroit Steel Products Co., has been elected president of the Detroit Railway & Harbor Terminals Co., which position he will hold while continuing his connection with the steel products company.

Spaunburg Named Director

Harvey L. Spaunburg, superintendent of manufacture of the Root Co., Bristol, Conn., has been elected a director of the company. Mr. Spaunburg has been connected with the Root company since the war.

Air Flight Closes Rawson Sales Trip

R. A. Rawson, sales manager of the Elcar Motor Co., completed his trip to the principal automobile distributing points east of the Rocky Mountains by an air flight from Wichita, Kan., to Chicago. Mr. Rawson was anxious to attend a meeting of dealers at the headquarters of the Rochford Motor Company, Illinois distributor for Elcar, hence the necessity of coming by air.

Walsh Boston Manager

George H. Walsh has been appointed manager of the new Boston office of the Young Brothers Co., Detroit. Mr. Walsh is a native of New England and is widely known in the foundry supply and equipment field there. He was formerly identified with the American Foundry & Machine Co.

Schwab Houston Manager

C. W. Schwab, formerly assistant branch manager for the Ford Motor Co., at New York, Philadelphia and Charlotte, N. C., has been made manager of the branch of the Ford Company at Houston, Texas. He succeeds R. S. Abbott, who has been promoted to supervisor at Philadelphia.

Hawley Named President of Hawdos Corporation

CORNING, N. Y., April 4—Stockholders of the Hawdos Corp. elected directors for the coming year as follows: C. C. Sherman, C. M. Sherman, W. C. Thompson, A. J. Berns, T. L. McNamara, J. G. Hawley. Officers selected by the directors are: President, J. G. Hawley; vice-president, T. L. McNamara; secretary, W. C. Thompson, and treasurer, C. C. Sherman.

The board of control, as named by the directors, consists of C. M. Sherman, C. C. Sherman, A. J. Berns, Donald Van Dusen, Wm. C. Thompson, F. R. Overhiser, T. L. McNamara, H. W. Cloos, Albert T. St. Claire, F. E. Doolittle, Geo. A. Hague, J. G. Hawley.

Bohn Has Best Year

DETROIT, April 5—The Bohn Aluminum & Brass Corp. and its subsidiaries in 1926 enjoyed the largest business in its history, according to the annual report just issued.

Hoof Company Moves

CHICAGO, April 4—John C. Hoof & Co. has moved to its new building at 162 North Franklin St., where it has improved facilities for better service.

Citroen Party Studies Detroit Factory Systems

Felix A. Schwab, managing director of the Citroen company, is head of a large delegation of Citroen executives and engineers who are now visiting the automobile manufacturing centers. Mr. Schwab this week is in Detroit with Benjamin King, head of the London branch of the company. Seventeen engineers, headed by Henri Guillon, are already here and five more are on the way.

Although there have been rumors linking the visit of this group to the United States with the plans of some American manufacturers, all such reports have been denied, and it is said that the Citroen managers are mainly concerned with studying American production and distribution methods and may purchase some machinery.

Staudinger Promoted

A. S. Murray, director, vice-president and treasurer of General Motors Export Co., has retired from the trusteeship and will be succeeded by Robert Staudinger, who has also been made a vice-president. Harry Tipper, general sales manager, returned to New York this week after a three months' tour of South America. J. D. Mooney, president, is sailing this week from Buenos Aires for New York.

San Francisco Airport Ready as Mail Terminus

SAN FRANCISCO, April 4—This city's new airport at the suburb of San Bruno has been officially selected as the western terminus for the San Francisco-Chicago air mail line. The first mail-carrying plane from the new field in Chicago will take off there July 1. The San Francisco field is to be ready for use by June 15. City officials and the Boeing Air Transport Co., which has the mail contract, have come to terms regarding rent, and the work of putting the San Francisco field in shape started late in March. This will be the only air mail port in the San Francisco Bay region.

Form New Truck Company

MINNEAPOLIS, April 4—The newly formed C. H. Will Motors Corp. has bought the assets and business of Wilcox Trux, Inc., a \$300,000 corporation. The company will have shops, foundry, assembly space and complete equipment for manufacture of trucks and buses. C. H. Will is to be president and treasurer of the new company; O. S. Caesar vice-president, and J. H. Colman, treasurer. Directors include H. L. Bollum of the Twin City Motor Bus Co., T. J. McGill of the Twin City Rapid Transit Co., R. F. Pack of the Northern States Power Co., Paul Tibbetts, and G. W. Traer and Edwin White, banker representatives.

Studebaker Makes New March Record

Shipments Reach 17,236 and
First Quarter 30,000—April
Schedule 19,000

NEW YORK, April 5—Records of the Studebaker Corp. of America were broken in March with a shipment of 17,236 cars against 15,656, the previous record made in March, 1923, President A. R. Erskine said today at the annual meeting of the corporation.

For the first quarter of the year production totaled 30,000 cars but the company's profits, while substantially in excess of dividend requirements, were below the level of the corresponding period of a year ago, due to poor business during the first six weeks. Mr. Erskine added, however, that this falling off in profits should be recouped in the second quarter.

The April production schedule calls for 19,000 cars against 11,000 a year ago.

Mr. Erskine said the company expected to sell 50,000 Erskine cars this year. During the first quarter 7427 Erskines were produced and 3759 of them were exported to 65 different foreign countries.

President Erskine told the stockholders he expected 1927 to be the best year the company has ever had, both in volume of sales and profits. He based his statements upon his belief that the Erskine would substantially augment the company's earning power and development of the Studebaker "S" six line has further strengthened the company's position.

Mr. Erskine added that a week from Sunday the corporation would make an announcement of extreme interest to shareholders but he declined to go into details of the announcement at this time.

Bosch Plaintiffs Plan Supreme Court Appeal

NEW YORK, April 5—The suit of Otto Heins and Albert R. Klein to recover their former holdings in the Bosch Magneto Co. was dismissed yesterday by the United States Circuit Court of Appeals. It was announced today by Hiram C. Todd of counsel to the plaintiffs that the case would be taken to the United States Supreme Court.

The court's opinion sets forth that "clearly title of the seized property was vested in the United States under the Trading with the Enemy Act," and that "any suit to redress the alleged wrongful disposition of the seized property must be brought by the United States, any claim to property seized or its proceeds being made in accordance with the provisions of that act."

The opinion was written by Judge Julian W. Mack and concurred in by Judges Martin T. Manton and Charles M. Hough. The suit was against A.

Mitchell Palmer, alien property custodian at the time of the seizure; Francis P. Garvin, managing director under Palmer; Martin E. Kern, purchaser of the property from the alien property custodian, and the American Bosch Magneto Co., which Mr. Kern organized to continue the business.

War Brings Halt to Chinese Sales

NEW YORK, April 5—Automotive business is at a standstill in the parts of China immediately affected by the current hostilities, but China was never an important market for exports and the volume of overseas trade is not perceptibly curtailed, according to leading export firms here. Shipments of cars and trucks held up for a while surprisingly well, as the armies made some purchases and some wealthy Chinese who fled from the scenes of hostilities also bought cars. These purchases have now practically ceased and there has been a slowing up in China generally.

Canadian Car Exports Show Drop in February

WASHINGTON, April 4—Canadian automobile exports during February decreased sharply while production showed a material increase, it was announced here this week by the U. S. Department of Commerce.

Shipments of passenger cars from Canada during February totaled 3597, as compared with 5296 in January and 5936 in February, 1926. Exports of trucks amounted to 1711, as against 2170 in January and 2472 in February, 1926.

Production increased from 15,376 units in January to 18,655 in February, of which 13,421 were passenger cars, 3325 trucks, and 1911 chassis of both types.

DuPont Output Gains 80%

DETROIT, April 5—Plant extensions which the E. I. duPont de Nemours Co. has been making at Flint, are nearing completion and the company expects to be in operation in the new buildings by April 15. The company enjoyed the greatest month in its history in March, when the output exceeded that of the corresponding period a year ago by 80 per cent at the Flint plant. Employment is also 25 per cent greater than at any other time.

Form Engineering Company

MOLINE, April 2—The Industrial Engineering Co., specializing in designing and building tools, dies and sheet metal fabricating machinery, as well as experimental and development work, has been organized by S. S. Battles and O. N. Brown, both formerly of the Illinois Oil Co. steel products plant in Rock Island. Mr. Brown was in charge of the Illinois Oil unit and prior to that association had been with the Studebaker Corp. of America.

Financial Notes

Goodyear Tire & Rubber Co. of Canada, Ltd., stockholders have approved the unification of the two preferred issues into a new 7 per cent preferred issue redeemable at \$110 and conversion of the common stock from \$10 par to no par value. Surplus has been increased by more than \$500,000 since last September, now exceeding \$3,500,000, and reserve has increased by \$250,000 in the same period. The plant is at the highest rate of production in its history.

Vacuum Oil Co. reports for 1926 net profit of \$24,133,655, after depreciation and reserve for Federal taxes. This is equivalent to \$9.65 a share earned on the \$2,498,832 shares of \$25 par value stock and compares with \$24,230,091, or \$9.73 a share on 2,487,998 shares in 1925. The total assets were \$141,520,066, against \$146,492,416 and profit and loss surplus was \$68,699,884 against \$55,914,812 at the close of 1925.

Vauxhall Motors, in which General Motors holds all common stock, reports trading profit for year ended Sept. 30, 1926, of £36. Reduced prices and increased output early in the year resulted in 63 per cent increase in sales in the first quarter, but coal strike abolished this advantage.

American Machine & Foundry Co. and subsidiaries for the year ended Dec. 31, 1926, show net profit of \$754,986 after depreciation, Federal taxes, etc., equivalent after preferred dividends to \$3.80 a share.

Continental Motors Corp., directors have declared the regular quarterly dividend payable April 30 to stock of record April 15. With this dividend the corporation will have paid the stockholders \$704,338 in 1927.

Keystone Tire & Rubber Co. for the year ended Dec. 31, 1926, shows deficit of \$213,682 after interest, depreciation, etc., against deficit of \$87,030 in 1925.

Emerson-Brantingham Corp. (new company) reports for the year ended Oct. 31, 1926, net loss of \$297,748 after depreciation and interest.

Republic Improves Models

ALMA, MICH., April 6—Republic Motor Truck Co., Inc., announces an improved line of motor trucks consisting of the 75 series ranging from 1½ to 1½ tons' capacity and the 85 series ranging from 1½ to 2 tons.

Several changes have been made in the models making up these two series, the most important of them being a newly designed polished aluminum radiator top tank, Gascolator, metal spoke wheels and pneumatic tires, air cleaner and a new type of tire carrier. Heavy duty bevel gear axles are now standard on both series.

Thomas Gets Brake Patent

WASHINGTON, April 5—After six years of litigation, Horace T. Thomas this week was granted by the U. S. Patent Office a patent for a transmission brake after two claims had been rejected on account of a friction device already covered.

Indiana to Stage Production Session

INDIANAPOLIS, April 2—The Indiana Section S. A. E. will hold its first production meeting, April 14. The program includes a paper on chromium plating by C. H. Humphries of the Metals Protective Corp. of Indianapolis; a paper on the relation of production to engineering by George Freers, assistant chief engineer of the Marmon Motor Car Co., and a paper on automobile production by W. K. Swigert, production manager of the Stutz Motor Car Co. of America, Inc. The motion picture of Norton grinding operation will also be shown at the evening session.

As an introductory to the meeting, an afternoon visit to the Marmon plant to inspect the new production layout of the little Marmon 8 will be staged through the courtesy of Marmon officials, at which time the actual operation of the new production plan will be inspected.

A.E.A. Catalog for Consuls

CHICAGO, April 2—The Department of Commerce has offered to distribute 325 copies of the Automotive Equipment Association's universal catalog now in process of compilation to American consuls in foreign countries as an aid to the export business of American manufacturers.

N.E.M.A. Moves Offices

NEW YORK, April 2—The National Electrical Manufacturers Association has moved its headquarters to the Graybar Building, 420 Lexington Ave.

Coming Feature Issues of Chilton Class Journal Publications

May 1—Automobile Trade Journal—Annual Big Small Town Market Number.

May 5—Motor Age—Annual Sales and Service Reference Number.

June 4—Automotive Industries—Engineering Number.

June 10—Motor World Wholesale—A. E. A. Summer Meeting Number.

Foreign Assembled Cars Total 13,392 in February

WASHINGTON, April 5—Material increases in the output of 22 foreign branch assembly plants of American automobile companies during February were reported here this week by the U. S. Department of Commerce. The reports show sales of 13,392 foreign assembled cars in February, as compared with 12,373 in January. The output in February, 1926, however, was 16,772.

Of the February sales 6071 were open passenger cars and 990 were closed cars, as compared with 5982 and 755 respectively in January.

Motor Wheel Sets Record

DETROIT, April 2—Motor Wheel Corp. broke all sales records in March, and all units of the company at Lansing are operating on a heavier schedule.

February Output 1% Below Average

WASHINGTON, April 7—Automobile production in February, based upon 100 per cent as the monthly average for the period of 1923 to 1925, shows a decrease of 1 per cent, as against 8 per cent in January and an increase of 18 per cent in February, 1926, according to a new index of manufactures submitted here this week by the U. S. Federal Reserve Board.

February automobile tire output was indexed at 115 per cent, as compared with 112 per cent in February 1926, and 117 per cent in January this year.

Based on 100 per cent as the monthly average of 1919, employment in the automotive industry in February was 117 per cent, as compared with 104 in January and 133 in February, 1926. Payrolls were rated at 140 per cent in February, 94 per cent in January and 166 per cent in February, 1926.

Hardware Meeting May 5

PHILADELPHIA, April 3—The sixteenth annual meeting of the metal branch of the National Hardware Association will be held in Cleveland, May 5 and 6, with headquarters at the Hotel Cleveland. F. O. Schoedinger will preside.

Welders Meet April 27

NEW YORK, April 2—The eighth annual meeting of the American Welding Society will be held April 27, 28 and 29 in the Engineering Societies Building.

Calendar of Coming Events

SHOWS

Atlantic City	June 4-10
Exhibition, Million Dollar Pier, National Electric Light Association.	
Barcelona	April 27-May 8
Budapest	June 4-15
Cleveland	Sept. 19-23
Exposition Public Auditorium, National Machine Tool Builders' Assn.	
Cleveland	Oct. 3-7
Exhibition, Public Auditorium, American Electric Railway Ass'n.	
Cologne	May 20-31
International Commercial Transport Exhibition.	
London	Oct. 14-22
Olympia Passenger Car Show.	
London	Nov. 17-26
Olympia Truck Show.	
Melbourne	May
International Motor Show.	
New Haven, Conn.	Sept. 6-9
Machine Tool Exhibition.	
Paris	Oct. 6-16
Grand Palais.	
Riga	April 10-17

CONVENTIONS

American Automobile Association, Annual Meeting, Ritz-Carlton Hotel, Philadelphia	June 16-17
American Drop Forging Institute, French Lick Springs, Ind.	May 17-19
American Electric Railway Association, Public Auditorium, Cleveland	Oct. 3-7
American Gear Manufacturers Association, Annual Meeting, Hayes Hotel, Jackson, Mich.	May 12-14
American Society of Mechanical Engineers, White Sulphur Springs, W. Va.	May 23-26
American Welding Society, Engineering Societies Bldg., New York City	April 27-29

Associated Automotive Engine Builders, Hotel Winton, Cleveland	May 26-28
Automotive Equipment Association Summer Convention, Multnomah Hotel, Portland, Ore.	June 27-July 2
Chamber of Commerce of the United States of America, Washington	May 2-5
Motor Truck Industries, Inc., Palmer House, Chicago	April 14
National Association of Automobile Show and Association Managers, Drake Hotel, Chicago	July 26-27
National Electric Light Association, Million Dollar Pier, Atlantic City	June 6-10
National Foreign Trade Council, Hotel Statler, Detroit	May 25-27
National Hardware Association, Metal Branch, Hotel Cleveland, Cleveland	May 5-6
National Highway Traffic Association, Automobile Club of America, New York	April 15
National Safety Council, Stevens Hotel, Chicago	Sept. 26-30
Society of Industrial Engineers, Hotel Stevens, Chicago	May 25-27
United States Good Roads Association, convention, Savannah, Ga.	June 6-11

N. A. C. C.

Chicago, April 13-14—City Traffic Conference.	
New York, May 31—Bus Meeting.	
New York, June 2—Annual Meeting.	

S. A. E.

Chicago, Dec. 1—Tractor Meeting.	
Detroit, Sept. 19-20—Boat Ride, Cleveland to Detroit.	
Sept. 21-22—Production Meeting.	
French Lick Springs, Ind., May 25-28—Summer meeting.	

Sectional

Buffalo, April 25-26—Aviation and Aeronautics—Joint meeting with Aeronautics Division American Society of Mechanical Engineers. Inspection trips.	
Chicago, April 12—Traffic—Carroll E. Robb.	
Cleveland, April 18—Air Travel as a Practical Means of Transport—Col. Paul Henderson.	
Dayton, April 21—Recent Developments in Lighter-than-Air Craft—Dr. Karl Arnstein.	
Detroit, April 27-28—Reducing Avoidable Waste in Production—Joint meeting with American Management Association.	
Indianapolis, April 14—Chromium Plating—C. R. Umphreys; Engineering Relationship to Production, George Freers; Fabricating the High Grade Motor Car, Max Thomas and W. K. Swigert.	
New York, April 21—Highways and Vehicles—Dr. T. R. Agg and O. T. Kreuser.	
Philadelphia, April 12—Traffic Problem—Harold M. Lewis.	

RACES

Abilene, Texas	July 4
Altoona, Pa.	June 11
Altoona, Pa.	Sept. 5
Atlantic City	May 7
Atlantic City	Sept. 24
Belgian Grand Prix, Spa-Francorchamps	July 9-10
British Grand Prix, Brooklands	Oct. 1
Charlotte, N. C.	July 11
Detroit	Sept. 10
French Grand Prix, Monthery	July 3
Indianapolis	May 30
Los Angeles	Nov. 27
Salem, N. H.	June 25
Salem, N. H.	Oct. 12
Syracuse, N. Y.	Sept. 3
Targa Florio, Sicily	April 24